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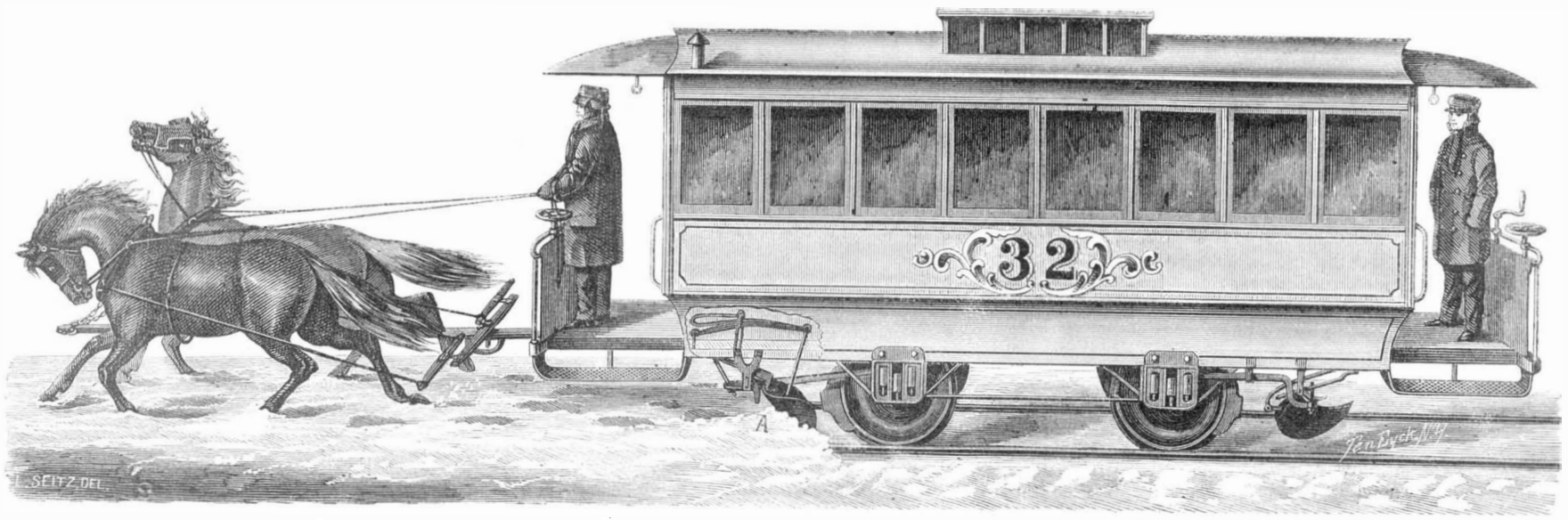
Device for Clearing Snow from Street Railways.

Those who habitually use the facilities offered by the street railway cars in our cities are frequently annoyed in the winter season by the occasional gliding of the car from the track, and the managers of these lines of communication are subjected to great periodical expense to free their tracks from accumulations of snow. During and after the late snow storms in New York city, travel by these lines was rendered difficult, and in some cases interdicted; relays of men, assisted by immense snow plows being required to free the track so that ordinary travel could be resumed. Except when a sudden fall of very heavy snow occurs, it would seem that some ready means might be employed to keep the track clear so that the cars could run without being thrown from the rails. This is the object of the snow plow shown in the engraving as attached to a street car.



SNOW PLOW FOR HORSE CARS.

The invention consists in mounting the plow forward of the wheels at each end, in such a manner that when in a position to operate it will adapt itself in respect to position and elevation from the track to the load in the car at the time; so that whether the car be empty or heavily loaded, the plow will be held in a proper position, and at a suitable distance above the rail. The plow is made of wrought and cast iron, with steel points, the form being suitable for lifting the snow and throwing it to one side of the track. It is made to fit all varieties of rail.

The position of the plow is determined by a rocker and vertical crank shaft connected by a chain, which, by being wound up by means of a brake, throws the plow into the desired position with its point near the rail. By reversing the motion of the crank the plow is brought high above the rail, by means of a spring in the side of the body of the car. If the plow should meet an obstruction, as a high joint, spike, or anything immovable on the track, it would, by a simple arrangement, be swung rearward until the obstruction be passed, and then be returned automatically to place. The driver puts the plows of the forward end down when starting, and they require no more attention until arriving at the terminus of the route.

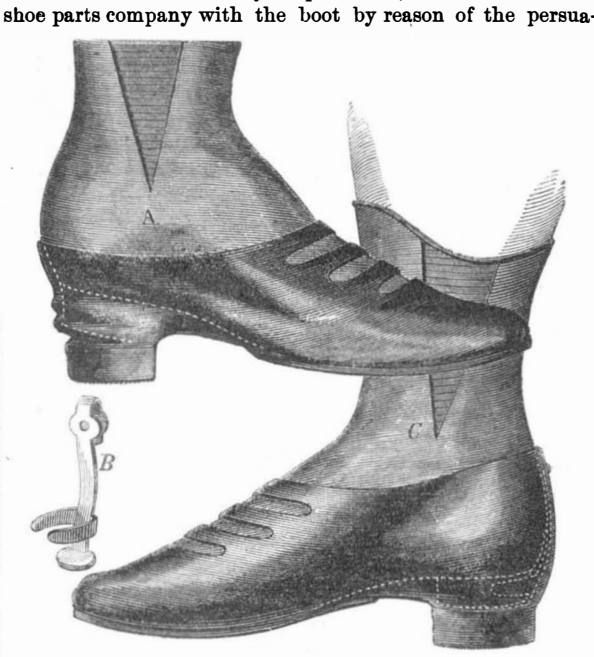
The proprietors mention some of the advantages of these plows as follows: "They are always at hand, and during or after a storm, constantly keep a clean rail for the wheels to run upon to and from each terminus. They are not only valuable for removing snow, but other obstacles that obstruct the track. On some roads which are not paved the tracks are frequently covered with sand, mud, or stones, causing a jolting in the car which is very unpleasant for the passengers, and also tends to increase the wear and tear of the cars, and oftentimes throws them from the track. These plows will remedy that, and leave a clean rail, thereby also decreasing the draft on the horses. They have been found of very great service after a thaw or a fall of snow or rain during the day or night, making the streets wet and plashy, and afterwards clear off cold and freezing; the cars running continually will remove the water as fast as it freezes, and leave a clear rail. They will also be found useful in preventing the numerous accidents which frequently occur by passengers falling from the cars under the wheels, thereby endangering both life and limb." They can be manufactured by the railroad companies themselves, and are quite simple, cheap, and easily attached. They have been introduced into the cities of Providence, Worcester, Hartford, New Haven, Philadelphia, Troy, and Albany, and have given good satisfaction to the managers and passengers of the roads, having been severely tested during the winter of 1866–'7. All communications respecting rights to use, or manufacture, should be addressed to the American Snow Plow Company, Providence, R. I.

The Spruce Gum Business of Maine.

A correspondent of the Lewiston *Journal*, in a letter from Byron, Me., says: "The spruce gum business of this region is quite large. I am told that a merchant of Weld purchased in a single year $5,000 worth. A large number of men are engaged in gumming during the fall and winter months. Five and seven dollars a day is a common day's receipt. With such a stimulus the gum gatherer goes forth, equipped with a knapsack and hatchet. He commences his work, and by night, if he be expert, he will return to camp with fifty pounds of what is called hatchet and chewing gum. The former is worth nine or ten cents, the latter fifty cents, per pound; but a very small proportion is of the first quality. I have just met two men who have been on an eight days' cruise. They have gathered five hundred pounds; it will average ten cents per pound, netting them good wages, it will be seen. Some estimate the gum business of Maine at $50,000 a year in the raw material. I think it much more than that. In Franklin and Oxford counties, a very large quantity is gathered annually. It is taken to market from this region with four-horse teams. Last winter gangs of men were hired at $20 per month to gum."

WEIDENMAN'S PATENT STAY FOR RUBBER OVERSHOES.

Walking through mud and "slush" is always unpleasant, however well the feet may be protected; but when an overshoe parts company with the boot by reason of the persuasive influences of tenacious mud, it becomes decidedly unpleasant. This often occurs when the style of low rubbers, known as sandals, is used, and not seldom when the regular shoe is worn. The object of the device shown in the accompanying engraving is to prevent such annoyances. The figure marked A shows the ordinary rubber overshoe, as it frequently appears after the wearer has passed through a slough of mud, the dotted lines denoting the position of the boot. When once the overshoe has assumed this position it is more liable to slip, and in a short time contracts a permanent wrinkle, which ruins the fit and speedily destroys the shoe. B is the metallic stay which is the subject of this invention. It is inserted into the shoe in the process of manufacture, the upper portion overlapping the upper edge of the shoe, a yoke embracing the sides of the heel, and a foot passing under the heel. C exhibits an overshoe thus improved, the dotted lines showing the position of the stay and the outline of the boot. This appliance will not only prevent the slipping off of the rubber, but keep the shoe always in shape. Its cost is trifling, while its advantages are real, and obvious to all. It is quite an aid to the removal of the rubber, and can be applied to any style of shoe.



It was patented through the Scientific American Patent Agency, Nov. 19th, 1868, by J. Weidenman, who may be addressed Box 431, Hartford, Conn.

The Latest Pirate Treasure Delusion.

A correspondent of the Hartford *Times*, writing from Hazardville, Conn., Jan. 1st, says that great excitement exists among the Spiritualists in Scitico and Hazardville. One of the greatest spirit developments of the age, they believe, is about to occur, revealing to mortal man the hidden wealth and treasure which for three centuries has quietly rested in the earth, on the premises of Mr. Thomas Barrett, in the village of Scitico. The circumstances are as follows: A. D. Putnam, a lineal descendant of the revolutionary hero, who says he has recently been sent here from the State of California, through the influence of the spirit of Benjamin Franklin, has vigorously set to work three sets of men, night and day, paying at the rate of $3 per day, in digging a subterranean passage, which he claims to lead to a cave under a large hill, which hill is close to the bank of the Scantic river, a little west of the Scitico stockinet factory, where the spirit of Benjamin Franklin assures him he will find valuables in the shape of diamonds and bars of gold to the amount of five millions of dollars, (!) which was deposited by Spanish pirates three centuries ago, who, after being hotly pursued, burned their ships at or near the mouth of the Connecticut river, taking their small boats and coming up the Connecticut, being closely followed. They took the Scantic as far as Scitico Falls, calculating on taking an overland route to Massachusetts Bay, but being attacked by the Indians, and two of their number being killed, they deposited their booty in what was called a natural cave at that time, covering the mouth of the cave with stones. Mr. Putnam says he shall enter the cave, if filled with wolves, angels, or devils; and if he is as successful in dragging from this subterranean vault the five millions as his great-grandfather was in unearthing a she-wolf, clairvoyant mediums will be above par in this place. There are a large number of persons visiting the spot daily, from far and near. Strangers, and those coming from a distance, will be furnished with a guide by calling at the shoe store of Mr. Thomas Barrett, the owner of the land. The disposition to be made of the gold is as follows: Mr. Barrett, the owner of the land, has one fifth; the Governor of the State, one fifth, to be used for educational purposes; a gentleman in Boston, one fifth, to be used for the Catholic Society, as the Spaniards were Catholics; one fifth to the Spiritualists, and one fifth to Mr. Putnam.

THE packing of bottles, filled or empty, says an exchange, is now performed more safely, closely, and rapidly than heretofore, by means of rubber rings slipped over them. The rings cost only once, and can remain on the bottle as long as it lasts.

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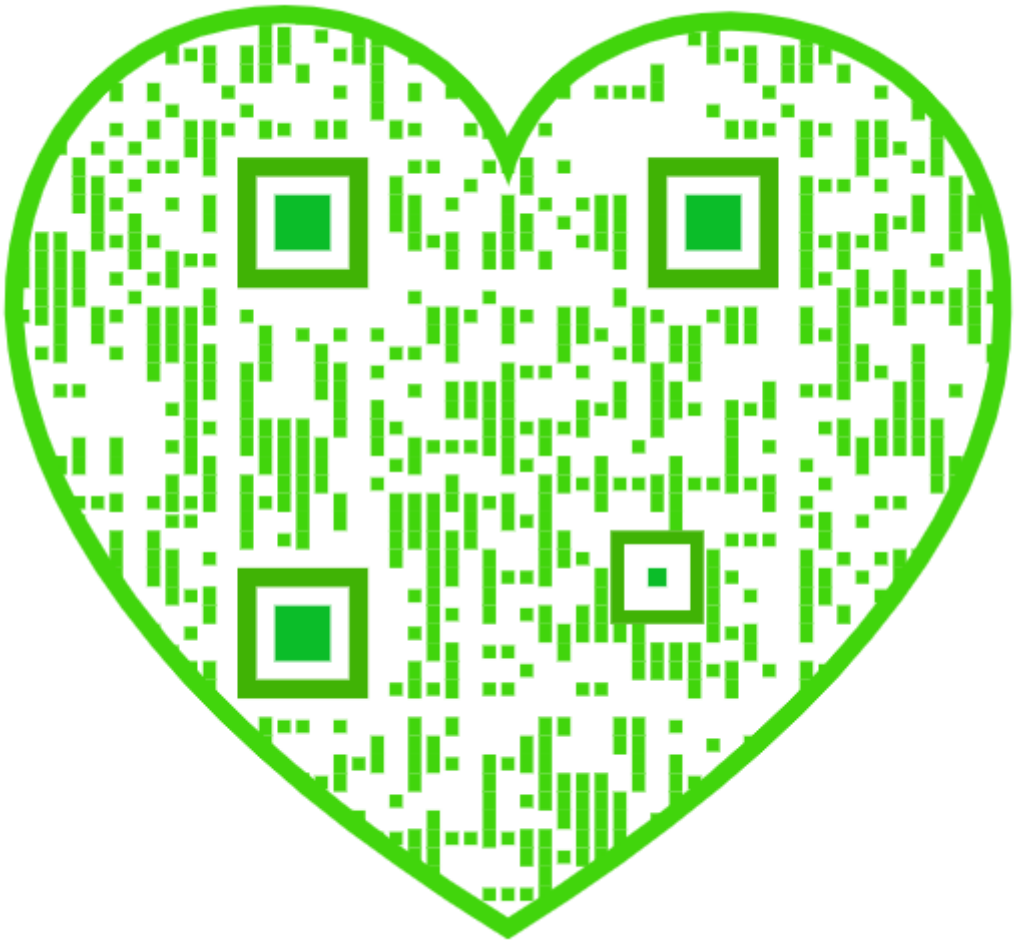

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

SUB-AQUEOUS AND OTHER TUNNELS.

[Concluded from page 35.]

THE THAMES TUNNEL.

England is full of tunnels, and some are of wonderful length. Before the introduction of railways, when canal transportation was all the rage, the construction of tunnels through hills and mountains was very common. Among the most remarkable of these canal tunnels were those at Worsley, on the Bridgewaters Canal, which were eighteen miles length.

The most difficult and expensive tunnel ever constructed, considering its length and size, was the Thames tunnel. The time occupied in its completion was eleven years, and its cost was £454,714, or about $2,273,570. The total length of the tunnel, from shaft to shaft, is 1,200 feet. The immense difficulties experienced, and the great outlays involved in the construction, were not due to the hard nature of the soil through which the tunnel was laid. We have already described the previous construction of the drift way or small tunnel, which was readily carried through nearly the same route, at a small cost. We have also described several different plans which would have been much cheaper, quicker, and better. The Thames Tunnel Company deliberately selected at the outset the most ponderous, massive, costly, and difficult scheme of construction that could possibly have been chosen, and then adhered to their choice with a dogged pertinacity characteristic of John Bull. The company might have abandoned their plan for a simpler one at almost any stage of the work, and could have saved money by the change. But they stuck to it heroically until their treasury was exhausted; they then applied to government and obtained aid to insure the completion, or rather almost the completion; for the tunnel is still unfinished. Only one of its two divisions has been finished inside, and the spiral roadways for teams, in the shafts, have never been erected. Only foot passengers can pass through, and from these a small revenue is derived, little more than sufficient to pay the expenses of attendants, cleaning, and repairs. But this wonderful structure, solid and magnificent as it is, will not always remain an idle curiosity. All that is wanting to render it useful is the construction of proper and convenient approaches. The progress of metropolitan population and enterprise is so rapid that every possible avenue of communication will soon be overloaded, and the Thames Tunnel will probably become a great and important railway thoroughfare.

Mark Isambard Brunel was the projector and engineer of the present Thames Tunnel. He was the inventor and patentee of a novel shield intended to cover the head of the tunnel and protect the workmen while they excavated the earth under the bed of the river. The construction of the shield was such that as fast as the excavation was made the shield could be pushed forward and the masonry of the tunnel built up in the rear of the shield. The directors of the company appear to have been greatly struck with the merits and novelty of Brunel's shield. It was an immense machine. Its face was 38 feet wide and 22 feet 6 inches high. It was larger and heavier than many of our country dwelling houses; and the plan was to excavate an aperture under the river bed large enough to receive the structure and then move it through as the excavation progressed. It almost passes belief that such a huge, unwieldly machine could be pushed through the bowels of the earth, underneath a river, its waters pressing down with a force of 2,000 pounds to the square foot. But the feat was actually accomplished, though at snail pace, the annual average movement being only one hundred feet a year.

Mr. Brunel once stated before the Royal Academy of Sciences at Rouen that the idea of his *shield* suggested itself to him upon an examination of the insect called the Teredo, well known for its ability to bore through the largest timbers under water. Its head is protected from the water by a species of shield.

Dr. Tomlinson gives some interesting particulars concerning the building of the Thames tunnel. A vertical shaft of masonry, over 3 feet thick and 50 feet in diameter, was first sunk in the river bed, to a depth of 80 feet. This was a most laborious and expensive work. A similar shaft was subsequeutly sunk on the opposite side of the river, with which the tunnel connects. During the progress of the tunnel the river burst through between the brick work and the shield several times, and a number of lives were lost.

The excavation for the tunnel was thirty-eight feet wide, and twenty-two feet six inches high, and in order to leave a sufficient depth of ground in the middle of the river above the brickwork, the tunnel was formed with a declivity of two feet three inches in 100 feet. The ground above was supported while the excavation was going on by a shield, consisting of twelve massive iron frames, placed side by side, and capable of being slid forward, independently of each other, for a short distance, by means of screws abutting against the end of the completed brickwork, which followed closely on the excavation. The shield was supported on flat soles, capable of being easily moved foward; the top and sides were also closed in by flat plates, which were supported by massive framing, and also fitted close to the brickwork, by which means the soft earth was prevented from falling in. Each frame of the shield consisted of three stories, with a cell in each, in which one man could work; the front of each cell protected by a series of narrow poling boards, each of which was held in its place by an arrangement which allowed it to be fixed in a vertical line even with the face of the shield, or a few inches in advanee thereof. Each miner began operations by removing the upper poling board in his division of the shield, and excavating the small portion of earth thus exposed to the depth of about six inches; he then replaced the poling board, and caused it to press, by means of jack screws, against the face of the excavation; he next removed a second board, whereby a fresh portion of earth was exposed and excavated as before. When all the poling boards in one frame of the shield had thus been advanced six inches, the frame itself was moved forward, and the same series of operations repeated. The frames of the shield were thus alternately moved forward, slowly and with great caution, the brickwork following close upon the shield, and inclosing two arched passages, twenty-six feet four inches in hight from the invert to the crown of the arch, and thirteen feet nine inches span at the springing of the arch. This shield was so damaged in the course of the work that it had to be taken down, and a new one raised. The arch, the invert and the curved side walls, are laid in concentric rings either a whole brick or a half brick in thickness, each ring presenting a plain face, no bond being employed between the successive rings. The tunnel is built with the hardest picked stock bricks; the first or inner ring of the arch is laid in pure cement, and the other portions of the work in half cement, and half clean sharp sand. The bricks for the semi-circular portion of the arch were molded to the true wedge form, so that the bricks radiated with parallel joints between them. The total thickness of the brickwork at the thinnest points where the inclosed arches approach nearest to the boundary of the rectangular mass of brickwork, is three feet. A solid wall, three feet six inches thick at the top, and four feet at the bottom, was constructed between the arches; small transverse arches being afterwards cut through it at intervals to form openings from one tunnel to the other. The whole of the brickwork is laid in Roman cement, and each archway is to be finished with a lining of cement, a carriage road, and a narrow footpath adjoining the central wall. Only one archway, however, has been thus completed. A brick drain is laid down from the center or lowest point of the tunnel, to the Rotherhithe shaft, by means of which any water that percolates through may be removed. The inclination of the roadway conducts the water from the other half of the tunnel into the drain.

THE SECOND THAMES TUNNEL.

A new, smaller, and cheaper, tunnel under the Thames is now in progress of construction by the Waterloo and Whitehall Pneumatic Railway Company. This tunnel is to be put down substantially on the Wyatt and Hawkins plan, heretofore described. That is to say, the tubes after completion are to be floated to the required line, then sunk in a ditch below the bed of the river. The tubes are built upon ways and launched like a vessel. The reader will find an engraving of one of these tubes taken from a photographic view as it appeared belore launching on page 165 of this paper, Vol. 16, March 16, 1867. The tunnel is to be composed of a series of ¾-inch boiler iron tubes, each 221 feet long, covered and lined with brick work. The extremities of the tubes are to be sustained in massive iron cradles, sunk in the river below its bed, upon foundations of masonry. The internal diameter is to be 12 feet, 9 inches.

THE WEYMOUTH TUNNEL.

This tunnel is 450 feet in length, excavated under the bed of the Backwater at Weymouth, England. It was commenced by sinking a shaft 50 feet through gravel and clay, of 14 inch brickwork, laid in hydraulic cement; the tunnel then strikes off horizontally a distance of 450 feet with a gentle rise to the other end. The tunnel is 7 feet high, 4½ feet wide. For fifty feet near one end where the clay is strong and retentive the walls are only nine inches thick. The opposite shaft is forty feet deep. The depth of water over the tunnel is 13 feet at high tide, 7 feet at low tide. There was but little leakage.

The construction of small tunnels under rivers is a very easy and comparatively cheap work. It is only when we come to gigantic structures of immense weight, such as the Thames tunnel, that the costs and difficulties become serious. The Weymouth tunnel was begun in 1834 and completed in a year.

PROPOSED TUNNELS BETWEEN NEW YORK, BROOKLYN AND JERSEY CITY.

An organization has been made for the purpose of procuring legislative authority for the laying down of tunnels upon the general plan just described between the cities of New York, Brooklyn and Jersey City. The proposed tunnel will be cheap in construction and is to have an interior diameter of about eight feet. The New York termini are intended to be at or near the City Hall Park, the terminus in Brooklyn being at or near the City Hall or the junction of Fulton and Court streets—a distance of less than two miles. Trains of passenger cars will pass through this tunnel from end to end in one minute and may be propelled by atmospheric pressure. The cars will be of about the same dimensions as the ordinary street passenger cars, will be brilliantly lighted, and run with very little noise or vibration. Experience has shown that air pressure is preferred as a motor to locomotive or horse power, as all jerking is avoided and the atmospheric car glides along with a smoothness resembling that of a vessel upon the water.

The number of passengers now annually carried upon the ferry boats between New York and Brooklyn is 40,000,000, being an average of 110,000 per diem, or 10,000 passengers per hour, reckoning the day at eleven hours, during which period the great majority are at present carried.

In the transport of passengers through the proposed Brooklyn tunnel trains capable of carrying 1,000 passengers will be started from each terminus every five minutes. 24,000 passengers will thus be carried every hour, which is more than double the amount of transportation now required.

The area of the cross section of this tunnel would be about the same as the Croton Tunnel or Aqueduct, which is 53½ square feet. The Croton Aqueduct from the dam to the reservoir is 40½ miles long, built of brick and stone. The whole cost, including dam, land, right of way, bridges, reservoir, etc,, was $12,500,000, Of this amount nearly $2,000,000 was for distributing pipes. The time occupied in construction was only five years.

THE CHICAGO TUNNEL.

Probably the longest sub-aqueous tunnel in the world is that at Chicago for supplying that city with pure water. It extends for a distance of two miles under the waters of Lake Michigan. This tunnel illustrates the cheapness and rapidity with which tubular structures of small dimensions may be cut in easy soil. The problem was to go horizontally through a strata composed chiefly of clay. The original contract price for the entire work was $315,000. But in consequence of the sudden great rise in prices the amount proved inadequate. Changes were also ordered in the construction of the piers and vertical shafts to give them greater solidity, and the contractors are understoood to have received much more than the contract price. Perhaps the largest share of the whole cost was involved in the construction of the two vertical shafts, as the horizontal tunnel was easily made. The outer shaft is 66 feet deep, 9 feet in diameter, composed of cast iron, set within a coffer dam which is 90 feet in diameter and 45 feet deep. The interior space between the dam and shaft is to be filled with solid stone work, and the pier thus formed is to be surmounted with a light house. The horizontal tunnel two miles in length was constructed in a little more than one year. It is 5 feet in diameter, composed of 8-inch brick laid in the best cement.

TUNNEL UNDER THE CHICAGO RIVER.

The tunnel under the Chicago River, Washington street, is now progressing rapidly and favorably. The contractors are Lake, Clark and Farwell. There is every prospect that the tunnel will be completed during 1868, when the people of Chicago will enjoy uninterrupted commuication with the opposite bank. The whole length of the work from the center of Franklin street to the center of Clinton is 1,605 feet of which 932 feet is the length of the tunnel; the remainder consists of the open approaches.

TUNNELING THE TEES.

A late number of *Engineering* describes a plan proposed by Mr. Head, of Middlesboro', England, for tunneling the river Tees for the purpose of connecting Middlesboro', with Norton Junction by rail. He says:

"I propose that it should be a single wrought iron tube, but divided into two passages by a water-tight web or bulkhead. This division should be strong enough to resist the pressure of the water, and preserve, at least, one side for traffic in case of accident to the other.

"As to the construction of the main tube, I would recommend something on the same principal as that exhibited in the hull of the *Great Eastern* steamship, *i. e.*, an outer and inner shell, for security and strength. The bottom should be made flat, or slightly arched downward. The whole section would thus resemble that of a gas retort or culvert.

"The best plan for placing the tube in position seems to be as follows: As near as possible to the point of crossing it should be constructed by the river side, in a temporary dry dock formed by earthern embankments, and at such a level that the tide would float it, if admitted by the removal of a dam. The tube should be erected upon timber balks placed crosswise at intervals of 5 feet, and bolted to the structure.

"These would be floated away with it, and afterward serve as sleepers.

"Meantime, the groove in which it was intended to lie would be cut across the channel of the river by dredgers. It is no new thing to dredge to an increased depth of 30 feet. It is, in fact, the cheapest method of excavating in all cases where it can be applied. The new Suez Canal has been greatly indebted to the use of dredging in the formation of its approaches. Dredgers have even been made to cut their way into the solid shore, the water following to float them as they made a channel for it.

"In the bottom of the groove so prepared concrete must be tipped from barges, and spread to a level by the aid of diving bells.

"When the tube was completed it would be necessary to cover over the ends temporarily to make it water tight. It would then easily be floated out of the dock to its permanent position. To let in sufficient water to sink it would not occupy many minutes more. The interval between the ebb and flow, which at spring tides is about an hour, would be ample to accomplish everything necessary. Concrete might then be teemed at the sides and over the top, and in this way, assisted by the natural tendency to silt up, it would soon become permanently fixed. Embankments of clay would now be thrown out from the shore on each side of the line of the approaches, and would join across the end of the tube. As soon as they were made water tight with clay puddle, the water between must be pumped out and the approaches built in the intervening space.

ROWLAND'S PLAN FOR SUB-AQUEOUS TUBE.

Mr. T. F. Rowland of Greenpoint, N. Y., is the inventor of a method of construction which has the merit of strength and solidity. A strong tube is first made of boiler iron, which is covered and protected by means of blocks of hydraulic cement, of segmental form, fifteen inches thick. These blocks are secured by means of screw bolts to flanges upon the ex

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terior of the tube, the arrangement being such that the bolts and iron work are wholly covered by the cement and carefully protected from the corrosive effects of the water. The exterior of a tube thus made would present a solid surface of hydraulic cement.

EDITORIAL CORRESPONDENCE.

Moorish and Spanish Andalusia—Cordova and its Christianized Mosque—Seville, its Cathedral and other sights—Malaga, its Climate, Beggars and Dry River—A Trip to Granada in a Dilligence—Curious Sights—Splendid Scenery—The Alhambra.

MALAGA, Dec. 14, 1867.

Andalusia, about which poets have sung and historians have written so much, comprises eight of the principal provinces of Southwestern Spain, and contains its most ancient and interesting cities. The country is also most oriental in its character, and possesses some fine scenery, and luxuriates in an abundance of tropical productions. The venerable olive with its scragged trunk and pale green leaves, the orange, the lemon, the graceful palm, the mournful cypress, and the mulberry, impart to the whole country a charming variety and loveliness. The aloe and cactus are abundant, and are planted in hedgerows along the railways, and sometimes for the division of farm lands. The valleys are sheltered by ragged, desolate mountains of gray granite, treeless and shrubless, and by brown hills, with intervening gullies,which often resemble vast buttresses or ridges of dirt thrown up by human hand to support some structure or earthwork. The vine is extensively cultivated upon these hills, and what adds much to the picturesque character of the scene are the white houses of the peasants, which are often perched upon these ridges like a dovecot upon the top of a barn. The villages are usually built upon a steep hill, or rugged crag, with moldering battlements and ruined watch tower, within which the people, in olden times, congregated for mutual protection in times of civil wars or against the roving bands of freebooters which, unhappily, are not extinct to this day. We have been in Spain upwards of a month, during which time it has rained but two days and one night. The sky is usually cloudless, resembling in color that our of beautiful October. The sunrisings are exquisite; the sunsettings brilliant beyond description. To compensate for the absence of rain, which rarely ever exceeds thirty-five days in a year, the nightly dews are said to be abundant, especially near the Mediterranean, and the land is channeled into watercourses for irrigation, and irrigating wells, worked by mules, are very numerous. The water is usually raised into tanks by the rudest possible contrivances, and then emptied into conduits, which are frequently built up of brick or stone, on an incline, and carefully cemented, so that the water can easily be carried to refresh any part of the land. The labor connected with this general irrigation of land is prodigious, but without all this care, Andalusia would soon become a sterile waste—forsaken and tenantless. Barns are seldom seen in Spain as there is but little hay raised. The land is chiefly devoted to the raising of grain,which is threshed upon a circular brick or stone threshing floor, by means of a heavy wooden boat or drag having pieces of flint inserted in the bottom. This machine is dragged about over the grain by mules, and thus, by the joint operation of stone-boat and mule's feet, the grain is got out, and afterward winnowed by natural currents of air.

The Moors once inhabited this whole region, and there still exist abundant evidences of their taste, civilization, and learning. They came over from Africa upwards of a thousand years ago, and expelled the Goth from the land, driving him Northward, so that at one time even Madrid was an outpost of the conquering Arab.

The dull old city of Cordova may possibly contain forty thousand inhabitants, but what must it have been in the days of its pomp and pride as the Moorish capitol! History, or tradition—which is often a clue to correct historical data—says that in the 10th century, under the dynasty of the Moorish princes, Cordova and its suburbs contained 300,000 inhabitants, 600 mosques, 50 hospitals, 800 public schools, 900 baths, and a library of 600,000 volumes. The arts and sciences were cultivated with assiduous care,and Moslems though they were, they never practised the *auto de fe*, nor encouraged the horrors of Inquisition. On the contrary it was their custom always to respect the liberty of religion, and to inscribe upon the doorpost the declaration of "impartial justice." The Cathedral, or more properly speaking, the Christianized Mosque of Cordova is doubtless the finest specimen in Europe of the true temple of Islam. Its proportions are vast,massive, simple, elegant, and impressive. It has not the overpowering sublimity of Gothic Cathedrals, owing to the fact that all Moorish structures were intended to impress a lowly humility upon the minds of its believers, and as a natural consequence, this cathedral mosque, though covering more ground than St. Peter's, at Rome, resembles a vast undercroft to some gigantic building above it. The interior is divided into nineteen naves, resting upon one thousand variegated marble columns, which support the Moorish or horseshoe arches. Spanish daub and whitewash have obliterated much of the rich Arabesque ornamentation, but enough still remains to testify to the exquisite taste and skill of the Moorish artificers. There are forty-five chapels in the cathedral, but the only ones worthy of notice are those that were left by the exiled Moors. The Sanctuary of the Mosque still remains, and its marble pavement mutely bears witness how faithfully the the Moslem performed his religious vows by going around it upon his bended knees. Recently a most touching scene occurred in this little sanctuary, on the occasion of a visit of a Prince of Morocco, who went on his knees seven times around t, praying, and weeping like a child. The gorgeous workmanship of his ancestors had been stripped of its brilliant decorations by a people who could not even read the Arabic inscriptions. The cathedral is surrounded upon three sides by some ecclesiastical buildings and a high wall, inclosing a fine large court which contains some beautiful palms, and a grove of noble orange trees, upwards of three hundred years old, and now fruitful even in their old age. In the center stands the very cistern that was used for ablutions by the Moors in the 10th century. Every day this beautiful court is thronged by priests, who smoke, and sun their sleek black garments, and by hideous beggars who watch and wait and annoy all visitors by their piteous cries and dissembled prayers. Such beggary and distorted misery I never before saw in any other country; and who can wonder that it should be so, when so many idle, well dressed priests are permitted to eat up the substance and hard earnings of the people. The revenue of the Cathedral of Seville supports, as I was informed, over one hundred priests, with a correspoding heavy distribution among the other twenty-six churches of the city. The Archbishop lives like a prince, and the poor people support all this idleness and extravagance in the name of religion. The streets of Cordova are very narrow, and the houses are usually two stories high, having patios or interior courts, paved with marble, after the Moorish style, provided, also, with galleries and fountains to shelter and cool in warm weather. Oranges, lemons, banannas, and rare plants and flowers are usually cultivated in these courts, and are always to be seen through grated iron doors—a most cheerful and refreshing sight. Moorish mills and other remains abound in Cordova, but their glory has departed, never to return. The beautiful Guadalquiver runs under an old stone bridge, the piers of which were built by Octavius Cæsar.

It is five hours' journey by rail from Cordova to Seville, which is perhaps the most interesting city in Spain. It stands upon the Guadalquiver, and the surrounding plains teem with the luxurious productions of the country. Like Cordova, it is ancient and Moorish; but by reason of its commerce, Seville appears to be an improving, busy, prosperous city. The chief attraction of all Spanish cities seems, first, to center in the old Cathedrals, and in this particular, Seville stands unrivalled in Spain, and second only to Rome, which disputes all competition. The Cathedral of Seville occupies the spot where the ancient Romans once had a Temple to Venus. This was substituted by an elegant Moorish Mosque, of which nothing now remains. The present edifice is Gothic, of the best period in Spain, and combines majesty, simplicity, and and elegance. I always make it a rule to visit the Cathedral at the hour of Morning Prayer, when the first light of heaven begins to stream through the richly painted windows, and the incense from the altars is diffusing its cloudy vapors. At such an hour there is present a sort of mysterious influence which increases the effect upon the mind to a wonderful degree, and especially so in the Cathedral, the interior of which is truly vast in all its proportions of length, breadth, and hight, and where unity and harmony seem to pervade every part. The only apparent defect—and it is a serious one—is that the high chapel and choir have since been built in the central nave, thus breaking the view and sadly marring the interior effect. People who do such things are unworthy to have so fine an edifice. The pavement of the church is laid in black and white marble, and beneath a large monumental slab is buried Fernando, a son of Christopher Columbus, who bequeathed a splendid library to the city, and was esteemed a man of piety and much learning. There are also some splendid pictures by Murillo, who lived and died in Seville, but, most unfortunately, their beauties are partially concealed by the sombre walls of the cathedral chapels. The Sacristy of the church is by far the richest in Spain, and contains valuable paintings, besides tons of silver and gold and other precious relics, some of which put the faith of skeptics to a pretty severe test. St. Ferdinand, the king who expelled the Moors from Seville, Beatrix, his wife, Alonzo, the Learned, and Donna Maria de Padilla, the celebrated mistress of Don Pedro, the Cruel, are buried in the chapel. The Moorish Giralda, or tower stands separated from the cathedral, and is a most exquisite structure. Its ascent is easily made, up thirty-four inclines, which a horse could easily traverse, and from the top the view of the city, plain, and distant mountains is truly glorious. Seville has a fine Moorish Alcazar, or Calif's Palace, which, in spite of the tinkering of Spanish Kings, still retains much of its former splendor, and certainly nothing can exceed its charming oriental gardens with their loaded orange and lemon trees, rare flowers, fountains, and long Moorish galleries which overhang them. The Alcazar is now the property of the Duke of Montpensier, son of Louis Phillipe, who has a splendid palace and orangery adjoining. The residence of the late Barber of Seville is pointed out, but the goodwill of his business seems to have departed with him,as the house is now occupied for domestic purposes. The famous *roué*, Don Juan, of Lord Byron's voluptuous pen, also lived here and died in the hospital La Caridad, which was built by Don Mauara, a wealthy profligate young nobleman. It is said that Don Juan died a "perfect example of piety, humanity, and abnegation." His frail humanity lies buried in in a room adjoining the chapel, where are preserved a model of his head, also, his sword, spoon, and fork; and upon a marble slab, over his remains, are inscribed the words, "Here lies the body of the worst man that ever lived. All pray for me." A sad inscription and a sad commentary upon an ill-spent life. The chapel of La Caridad contains the masterpieces of Murillo: Moses smiting the rock, and Christ feeding the multitude. Also, a most extraordinary picture, painted by Valdes Leal, called the "Dead Prelate." When Murillo looked at it, he said to the artist, "One cannot look at your picture without holding his nose;" to which the artist replied, "You have taken all the flesh and left me to work on bones." It is a curious picture to adorn the walls of a church, but it possesses a religious idea in the prelate's hat and robes, and that is enough to inspire the reverential awe of these benighted people. The small picture gallery has several fine Murillos—all religious subjects, and it is a pity that so many of this master's great works should be buried up in old Spanish towns, where few can ever see and appreciate them. An Englishman, who was here with us, said that he intended to propose to his government to swap off Gibralter for the works of the Spanish Masters. He thought it would be a profitable bargain to give up a big rock of expense for something really worth having. The ideal God of Spain, however, would depart with these truly noble pictures.

The Government Tobacco Factory, in Seville, employs 5000 women. The sight is the most singular spectacle of humanity to be met with anywhere. The girls earn about 50 cts. per day, and are supplied with a dinner in the building at a cost of four cents per head. They are of all ages and colors, and work chiefly in one immense hall. There were little babies lying in tobacco baskets; some were nursing, others being attended by larger children. Also, pet dogs and cats, and a general jumbling up of all sorts of things. The snuff is pounded in a wooden mill that resembled an old-fashioned fulling mill, and worked by mules blindfolded, possibly to keep the snuff out of their eyes, or to prevent them from being frightened by the ugly old mill which they are employed to grind. Persons fond of tobacco (and these girls are fond of it), may here see how their favorite weed is prepared, and of what stuff it is made. It is said that a very romantic marriage of love took place a few days ago—the union of an old tobacco maker of 102 with a tobacco damsel of 15 years. The centenarian had saved a little money, and was at a loss to know how he could bestow it in case he should ever die, therefore he fell in love with the maid and she fell in love with him—no doubt.

Near to Seville there are remains of a ruin where the three Roman Emperors, Trojan, Adrian, and Theodosius were born, besides many other things of substantial or vapory interest. But I must leave Seville after mentioning a single fact or two. It is the custom, in some of these old cities to employ a species of Nocturnal Muezzin to patrol the streets at night and call out the time and situation of things. They perform their duties in a sort of sing-song style which is often quite musical. Not knowing exactly what was going on under our window, we half imagined that we were being serenaded once in fifteen minutes; but, after a while, we found out what it all meant,and moreover, that our "Muezzin" was frequently employed to alarm the house whenever travelers wished to to get off early to the cars. The Spaniards are slow, but somehow their trains all start early. One night there was a sick person in the house, and a band of religious singers, bearing the crucifix and some banners, came under the windows and sung a sweet, plaintive song, or prayer, for his recovery. It was most singularly touching, and it is to be hoped that the pious exercise, so carefully performed, reached the ear of heaven.

We left Seville with some regret. It is a beautiful, balmy spot, and we much enjoyed its delicious sunshine under the orange groves in the public plazas. To reach Malaga from Seville it is necessary to return to Cordova and thence proceed by rail on a branch line. It is a good day's work, but some portion of the route passes through a country quite remarkable for its savage grandeur. The Sierras are several times pierced by tunnels, and the valleys are crossed by high embankments, the road descending by heavy gradients to the segmental shaped valley which lies back of the city of Malaga. Here the Mediterranean first appears to us, calm and beautiful as a lake upon a summer evening and, here also is found a climate more uniform than that of any other part of Europe. The thermometer in mid-summer rarely ever rises to 85°, while in winter it seldom sinks below 45°, the mean annual range being 49°, which is many degrees less than any other city on the continent. For example the mean temperature of Pau is 68°, Rome, 62°, Nice, 60°. Malaga is therefore a resort for invalids who require a uniform temperature, but to my mind existence might become a serious burden if it had to depend upon a permanent abode in a place so far out of the way of every body and every thing. The city though possessing upward of 90,000 inhabitants contains very little to interest a stranger, while to add to the discomfort, the hotels have more show than substance and their open doors are thronged by beggars who never give up their importunities so long as you are in sight. Just on the outskirts of the city there is a well kept and well arranged Protestant cemetery—to us a sort of hallowed spot of kindred dust, as it contains the remains of some of our countrymen who have either been wrecked upon the coast or have come hither to seek for the healing gilead which they vainly sought for elsewhere.

Malaga is cut in twain by a most extraordinary river called the Guadalmedina which, according to the map, has a tail up in the Sierras and a mouth in the sea. The river is carefully walled in and spanned by fine bridges, and is navigable for omnibuses and other wheeled vehicles up for a considerable distance. It is as dry as the Valley of bones depicted by the prophet Ezekiel. Nevertheless it is subject to fits, and upon one occasion when in a paroxysm of fury, the floods came down so violently that a number of houses were carried away. Just how all this came to pass is one of those Spanish riddles which sadly puzzles the unlearned traveler. Spanish rivers, like Spanish towns, are usually either dried up or are in very reduced circumstances.

Our trip to Granada partook very much of a warlike expedition. We started off in the morning at 6 o'clock upon an old dilligence, drawn by six mules and two horses on the lead. A heavy broad-beamed Wall street banker had se-

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cured in advance the four seats upon the top or *banquette*, and three gentlemen of our party were invited to share with him the privilege, and how four of us contrived to sit within such confined limits is still one of the mysteries connected with the laws of compressibility and elasticity of matter. The seats on the inside were arranged on the sides like those in a city omnibus, and were occupied by three ladies, four gentlemen, beside two Spanish brutes, dressed like gentlemen, who, regardless of the comfort of others, insisted upon smoking their dirty cigarettes. One of the leading horses was skillfully ridden by a lively little Spaniard who guided the team, and sounded the horn to warn our approach. Another lively young Spaniard armed with a heavy cudgel, fulfilled the office of team whipper, and most unmercifully did he perform his duty. I never before saw such cruelty, and as I witnessed the brutal and continued flagellations to which the toiling animals were subjected, I sighed for our own benevolent Bergh, and wished that he might be here to apply the workings of his Humane Society to inhuman Spaniards. The chief driver occupied a seat below us, and his duty seemed to consist in uttering a very peculiar yell which alone would have frightened even a lazy mule. At his side sat a dark-visaged man in uniform who had a pair of revolvers stuck into his russet-top boots; and behind, standing upon the step, was planted an armed guard.

Thus wedged and discomforted, we started on our expedition, "armed and equipped as the law directs," the mules upon the keen jump, horn blowing, cudgel flying, guard yelling, we whipped around the street corners, up the mysterious dry river to the foot of the Sierra, whence we began to ascend its steeps by winding and devious paths. I imagine that even Don Quixote and Sancho Panza would have fled at our approach. The road was patrolled by armed guards, and even the workmen employed to keep it in repair were fortified with gun, cutlass and ammunition. Travelers on horse and mule back, carried guns strapped across their saddles, and everything betokened some real or imaginary danger; but we pursued our journey in peace, and for some hours in sight of the city of Malaga and the Mediterranean. From our elevated position we beheld the full glory of one of those Spanish sunrisings, which are said to exceed in splendor those seen in any other portion of Europe. For ten hours we traversed mountain, hill, and valley. No trees, no fences, but the whole scene most extraordinary, curious,—often wild, savage, and desolate. The roadway was lined with heavily laden mules and donkeys, sometimes with camp chairs strapped upon their backs, for women to ride, the meek little beast led by some modern Joseph on a flight toward Egypt, and women with water jugs upon their heads like those carried by Rebecca when she went to the well.

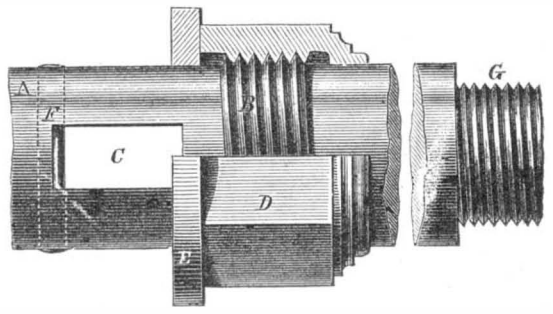
The costume of the men peasants of Audalusia is very peculiar. The hat is conical shaped, with a wide rim rolled over to form a sort of concentric channel, which would certainly be an awkward thing in a rainy country. The jacket is usually short, and made up sometimes of velvet, but more frequently, like Joseph's coat, of many colors. The breeches worn at this season of the year are of sheep skin, wool side out, and tied together by tapes, with a red flannel bandage wrapped about the waist, and over the shoulders they wear a heavy, fancy colored manta, or shawl, with the fold almost invariably thrown across the right shoulder. The leggins are of russet leather, nicely laced about the calf, and as for shoes, it is difficult to describe them. Most generally the shoe is simply a sandal made of canvas, with a braided mat for the sole, fastened to the foot by black lacings, and worn without stockings; but the poor classes tie their feet up in pieces of old hats, rags, carpets, and possibly cabbage leaves, for certainly I never before saw such a combination of material applied to human feet.

In ten hours we reached the old town of Loja, having in the mean time changed our animals three times. Here we took an inland railway, and after a ride of two hours across the splendid Vega, we reached the old city of Granada, and lodged ourselves under the very walls of the Alhambra—the Hotel of Seven Floors. We saw the Alhambra by moonlight, as Irving described it, also the Sierra Nevadas, lifting their sparkling, snowy crests high above this ancient city of the Moors. The sight was glorious indeed, and a visit to this historic and legendary spot, filled full of glorious deeds, "a sad but elegent memento of a brave, intelligent, and graceful people, who conquered, ruled, and passed away." The Alhambra of Irving is so familiar to all readers that I forbear to attempt even a feeble description; but I will say, to the shame and dishonor of the Spanish Government, that this beautiful gem of Moorish pride and consummate art will soon be reduced to a shapeless mass, unless the long projected restoration is at once carried forward. Granada is full of old Moorish habitations and remains. Its Gipsies still burrow like rabbits in the hillside. Its old Cathedral, a noble pile, contains the remains of Ferdinand, Isabella, Philip le Bel, and Crazy Jane, and, *sic transit gloria*, there is also the Cartuje, a vast monastery, which occupied the skill and labor and begging of three hundred monks for a period of thirty-six years,—now empty, save by a single old skeleton monk, who feebly answers the bell, the sound of which rings through those vast halls and corridors, like the curfew that tolls the knell of departing time. As we passed into the chapel, there sat the poor old monk, gazing as if in sad memory over the departed and departing glories of this beautiful monastery. The gilding, the sculpture, the precious marbles, the highly polished agates, the exquisite inlaying of silver, pearl, tortoise shell and ebony, together with the magnificent "Holy of Holys," all done by the exiled monks, is a combination of interior finish and skill which has no superior.

We left Granada and returned by the same route to Malaga, and on our arrival we were notified by the landlord that we could only stop one night, as all his house was taken for the next day, to accommodate the Archduke of Austria and suite; therefore, making a virtue of our seeming necessity, we are to be up and off the next morning for Valencia, with the prospect of a thirty-six hours ride. S. H. W.

Securing Cutters in Boring Bars.

MESSRS. EDITORS:—I noticed on page 408, No. 26, Vol. XVII., an article on an "Improved Method of Securing Cutters on Boring Bars." I herewith inclose a device which I consider superior to the one illustrated in the above-named paper. It consists of the usual bar, A, with a thread, B, cut thereon, directly above the slot, C, which receives the tool. On this thread a hexagonal nut, D, is screwed, which reaches nearly to the slot. A ring, E, bored sufficiently to slip over the bar easily, is slipped close to the nut, and is of such thickness that the outer edge reaches a little beyond the top of the slot. Through the bottom of the slot a steel pin, F, is passed, at right angles to the direction of the slot, one-half of the pin projecting above the bottom of the slot. The pin answers to the point of a set screw, which being backed by the ring and nut, holds the tool as firmly as in a lathe or planer.



After a little use without the pin the bottom of the slot would be likely to become uneven, or a little unevenness in the forging of the tool would give the tool a tendency to cant. The nut being squared on the arbor, the ring evenly turned, and the pin inserted, the tool will always be held firm and true. The use of the ring prevents the bottom edge of the nut from becoming jammed and uneven, which could not be prevented if allowed to come in contact with the tool; the ring to remain stationary and the nut to turn upon its upper face, which will always keep the nut true. If in use the ring should become uneven, it can easily be replaced. The pin can be hardened, and the ring, and the bottom of the nut case-hardened. A thread, G, may be cut on one end of the arbor, that it may be used in the spindle of an upright drill, or it can be used with a dog in a lathe. In the one referred to above, the tool requires two notches, which prevent the tool from being used except for a given size; also the edges of the nut when set against the tool will soon become uneven, which prevent the tool from being held true and firm.

In the one herein described the tool can be raised to suit conveniences. Where a tool is required for certain jobs, a notch may be cut in the bottom of the tool and fitting the steel pin, which will always bring it in the same position. It will also be less liable to break than if a square notch were cut. The position of the nut, D, is such that the diameter of the ring, E, appears more than that of the nut, but the diagonal of the nut is equal to the diameter of the ring.

JOHN A. BROWN.

Boston, Mass.

Steam Expansion.

MESSRS. EDITORS:—The expansion of steam is in proportion to its temperature above 212° heat. Any good engine working steam to a quarter of stroke, cutting off and expanding to near half stroke, will form a vacuum on the steam side of the piston the remainder of the stroke. Steam cannot exist in a temperature below 212°. Steam cannot expand below 212° heat, when it instantly changes to vacuum, and then goes lower down the scale of temperature. I affirm that steam of 75 lbs. of pressure cannot expand to twice its bulk without going below 212° heat. The temperature which corresponds to 75 lbs. of steam is about 304°. Expand this temperature to double its bulk, and you have 152°, which is below the atmospheric line of 212°. Divide the steam cylinder in the middle, divide half the cylinder into 152 parts by lines representing the degrees of heat, count down from 304 until you hit 212, and you cannot expand any further. You have expanded $\frac{92}{152}$°, and left 60 which are below the line of 212. This is the correct theory of the expansion of steam. But air expands under an entirely different law. A small percentage of air mixed with steam in a high pressure engine helps its expansion. But in a condensing engine it does more hurt than good, for it goes to the condenser. My assertions are that steam of 75 lbs. pressure will expand to $\frac{92}{152}$ of its bulk, and all other pressures expand according to temperature above 212°.

By publishing this you will cause many engineers to examine their cylinder cocks at different grades of cutting off, and thereby explode the old theories. GEORGE B. SISSON.

Buffalo, N. Y.

Safeguards to Railway Travel.

MESSRS. EDITORS:—Among the many suggestions now put forth to avoid such accidents as lately occurred at Angola, I see a double track advocated, with a double tread to the wheels, the flange being in the center of the face. The objection to this plan is the inevitable packing of earth, snow, etc., in the narrow space between the rails, thus increasing the danger it is proposed to obviate. Permit me through your columns to suggest the use of a double-flanged wheel, which will be much cheaper than the double-tread wheel, and require no change in the track. Each wheel should have a flange on the outside of the rail, as well as on the inside, and with such cars the entire flange might be broken from each side of every wheel on one side of the train, and the train would still be as safe as the ordinary single-flange wheels. The absence of a piece of the flange six inches or less in length from an ordinary wheel would certainly throw the car from the track whenever the centrifugal force in turning a curve should throw the car to that side of the track on which the defective wheel was running. With the double-flange wheel, one sound wheel on each axle is enough to insure the safety of the train. An obstruction which causes one wheel to mount the rail may throw off a single-flange car, but could do no harm to the double-flange wheels.

In regard to heating cars by hot water, would the flood of scalding water from the broken pipes have been any more merciful to the victims of the Angola holocaust? I admit that the bodies would have been recognizable, and perhaps a few might have been saved, but cannot something better be invented?

Knowing that the ventilation of such subjects through your widely circulated journal has the effect of stimulating invention, and ultimately of accomplishing the desired result, I take the liberty of making the above suggestions, which to me are new, but I hardly dare hope to be patentable.

Buffalo, N. Y. CALVIN E. TOWN.

On the Day Line Question.

We are in receipt of a number of communications on the "day line," a subject that must become of some importance to us in a national point of view, in regard to our recent acquisition of territory on the north-western coast of this continent, and which will undoubtedly receive the attention of congress. Among some half a dozen letters, some facts contained in one from J. M. C., of Ohio, may be presented. He says:—

"The first English missionaries to Tahiti passed round the Cape of Good Hope to the east, and the American missionaries to Hawaii passed round Cape Horn to the west. As a necessary consequence there was a difference of one day and night in the reckoning of time; and hence for over fifty-five years there has existed, and still exists, in the Pacific Ocean this singular fact: two groups of islands, lying on nearly the same degree of longitude, and not further apart than New York and London, whose inhabitants, although christianized, continue to observe the Christian Sabbath on different days of the week.

"This singular fact is thus explained: The succession of day and night is caused by the revolution of the earth on its axis from west to east. Now if a person should travel round the earth in the direction of its motion, he would gain an *apparent* revolution of the sun, or exactly one day and night. But if he should go in the opposite direction, he would *apparently* lose one day and night. Therefore, if two persons should start from the same point and travel round the earth in opposite directions, and meet again at the point from which they started, they would differ exactly two days in their reckoning of time, the one being one day ahead and the other one day behind those who had remained stationary.

"There are some additional facts connected with islands in the Pacific ocean. If you go west to the Sandwich Islands, you will find them keeping the Sabbath on the same day with yourselves. If then you pass almost directly south to the Society Islands you will find that their Sabbath had occurred the day before yours. But if you should go east round the earth to these islands the case would be reversed. How these islands will ever be made to observe the same day for Sabbath is a question yet unsettled. However, I think the above is sufficient to show that the 'day line' is in the Pacific Ocean."

Singular Discovery.

A singular discovery has just been made at Chagny, France, by some workmen engaged in digging the foundations of a railway shed. At the depth of about nine meters, in a stratum of clay and ferruginous oxides, remains of proboscidians (elephants, rhinoceroses, etc.), were brought to light, comprising several black teeth and a formidable tusk in large fragments, which, on being put together, constituted a length of seven feet. The depth at which this was found was still six meters higher than the level of the most considerable inundations of the Dheune, and in an undisturbed stratum. *Galignani* says: "So far there is nothing absolutely extraordinary; but who would have thought of finding, underneath the bed containing these fossils of the tertiary period, an aqueduct of the most primitive kind and of human workmanship? Yet such was the case, the only instance of the kind on record. It is explained by M. Termaux, who relates the circumstance, by supposing, what seems indeed to have been the fact, that the tertiary fragments above alluded to had been washed into the trench by a violent inundation, and thus filled up the aqueduct. The latter is about eighty centimeters in depth, sixty centimeters broad at the bottom, and only forty in breadth at the upper surface. It is not easy to account for this principle of making the conduit narrower at the top than at the bottom; at all events, the small dimensions of the cavity were evidently caused by the want of proper tools, as to this day the negroes of Africa, in their miserable attempts at what might be termed public works, remove as little earth as possible. However that may be, the discovery of this aqueduct does not by any means authorize us to carry the antiquity of man as far back as the tertiary period; for, although the aqueduct lies uuder a stratum of tertiary materials, this stratum does not belong to the place, but was transported thither later."

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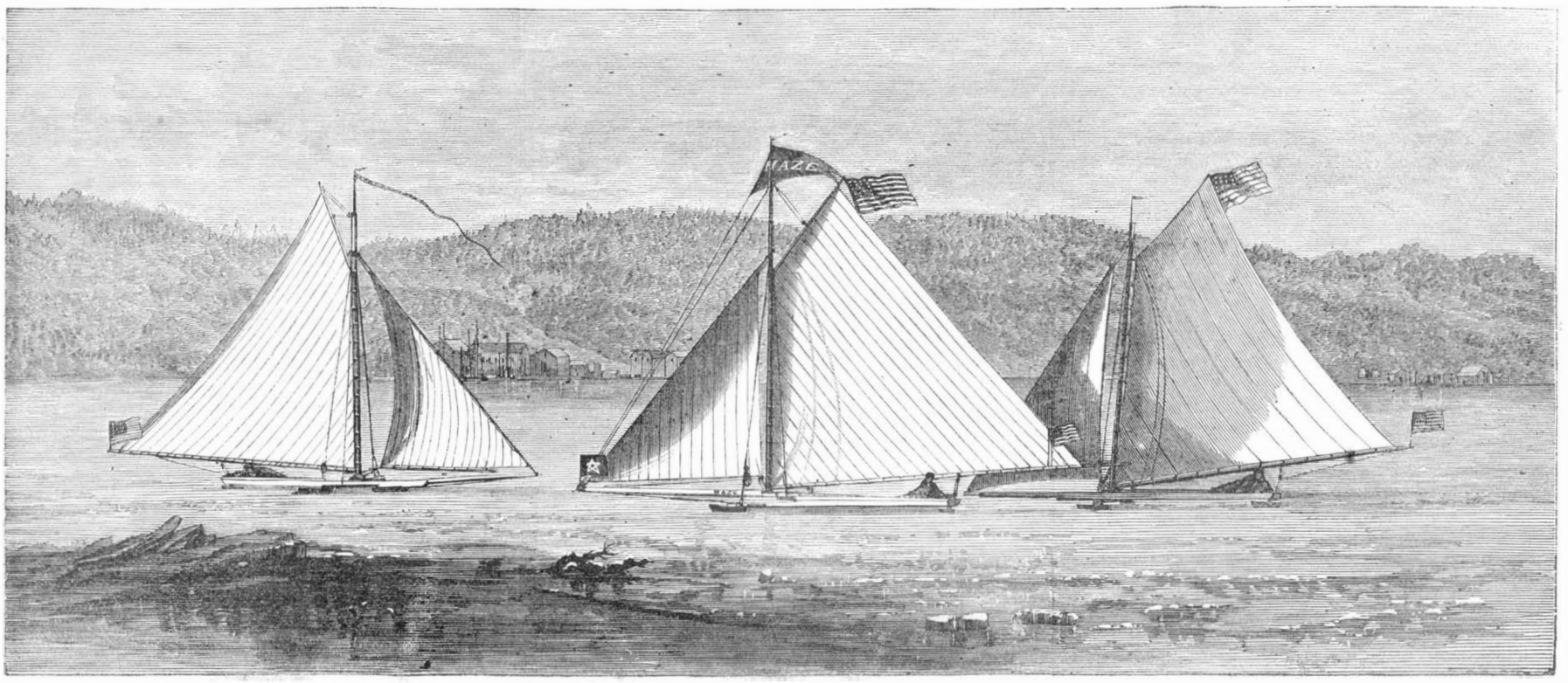
Navigating the Ice---Exciting Winter Sport.

Ice sports are not limited to the pastime of skating; sailing over the glassy surface where there is plenty of "sea room" and wind, is not less exciting than skating, and entails none of its labor and after weariness. The speed that can be attained by ice boats is something marvellous; a rate of over 60 miles per hour being not uncommon. A year ago one boat on the Hudson made eight miles in less than six minutes. The ice boat is exceedingly simple in construction and the hull can be built at a merely nominal cost; but in fittings and decorations there is ample room for expenditure and show, and some of those on the Hudson are marvels of beauty and very costly.

A boat, however, can be made of a few planks, three skate irons, a mast and sail, at a cost of a few dollars, which will carry the navigator at a speed rivaling that of the swiftest birds and far outstripping the locomotive. The boat is V-shaped, composed of three planks, two forming the arms of the V and one connecting them at the wide end. Under the two ends are skate irons hung on pivots to allow swing, and another at the intersection of the two arms. By the latter the craft is steered. The rigging may be of any style desired; usually sloop or yacht rig. These boats sail admirably on the wind, their broad base holding them up almost into the "wind's eye." They may be numbered on the Hudson by scores; something over a hundred being owned by the various clubs and private persons. Very exciting regattas take place on this river during the winter season when the condition of the ice and state of the wind invites. Attempts have been made, we believe, to utilize these ice boats for passenger and freight travel, but we are not aware that they have as yet been successful, although we see no reason why they may not be made so.



VIEW OF ICE BOATS ON THE HUDSON RIVER.

Facts for the People About Gas.

Under this heading a late number of the *American Gas Light Journal* furnishes some practical advice concerning the management of gas, and some simple facts the knowledge of which may save our readers much dissatisfaction, annoyance and useless expense:

"It is a common occurrence for consumers to complain of the excessive cost and deficiency of light. To the inaccuracy of the meter they generally attribute the first, and to the poor quality of gas the latter condition is usually charged; when, in reality, the fault will generally be found to rest with the consumers themselves, through their own ignorance and mismanagement.

"Whenever light is obtained from gas at a greater cost than necessary, it is just as much a loss as to permit any other valuable commodity to run to waste. And a proper knowledge of the conditions that cause unnecessary loss, will place in our hands the means requisite to avoid and prevent it.

"BURNERS.—There is no part connected with the consumption of gas, whereby the best results are obtained in the quality of light and economy of gas, of more importance than the burners.

"It would be difficult to convince the majority of gas consumers, who have not given the subject attention, how remarkably the light derived from gas is reduced by improperly constructed burners; or where the pressure or the flames are unsuitably adjusted. Owing to these circumstances, the amount of gas consumed is disproportionate to the light obtained, and the account of the consumer is much increased. In fact, there is no exaggeration in stating that a large proportion of the consumers, through their own mismanagement, pay twice as much as there is any occasion for, considering the amount of light obtained, all of which could be saved by using a proper burner, and a correct adjustment and control of the pressure.

"The most important requisites for good burners are that the orifices where the gas issues should be perfectly regular in size, and of a proper size to permit it to issue with a very low pressure. And these conditions should be adhered to, whatever the kind of burner may be, whether the argand, bats-wing, fish-tail or single jet, etc.

"If the orifices are too small a high pressure is required to expel the gas, and the light is diminished just in proportion to the increased pressure. In such burners the flame will have a blueish tinge, and the lower part will be of a deep blue color, giving but little light in proportion to the gas consumed. As an example, an argand of fifteen holes passing five feet of gas at 1·10th pressure, yielding a light of 12 candles will, if the orifices are reduced, to pass the same amount of gas per hour at 5-10ths pressure, only give the light of six candles—a loss of 30 per cent. Hence we see that the light to be obtained from a given quantity and quality of gas is entirely dependent on the burner employed. This demonstrates the necessity of having proper burners, and shows clearly how by negligences on this point, the consumer may find his gas bills increase, in what appears to him a very mysterious manner.

"SIZE OF FLAME.—It is a mistake to suppose that the amount of light obtained will be in proportion to the quantity of gas issuing from a burner. There is a particular point in the consumption of any class of burner where the maximum of light is derived, and any deviation from this entails loss.

"As an example, if an argand burner consumes five feet per hour, giving the light of 12 candles, be reduced, so that only three-fourths of that quantity is burned, then the light instead of being equal to nine candles, the theoretical proportion, will be six candles only, being a positive loss of 36 per cent. This reduction may be continued with even greater proportionate losses. A five-feet bat-wing or fish-tail burner will give a maximum of light in proportion to the gas consumed, compared with any less sized burner, and it will be found in practice the larger sized burners are the most economical. The large sizes giving as high as 200 to 300 per cent advantage in light as compared with the smallest sizes.

"As an example; a bats-wing burner consuming two feet per hour gives the light of two and a quarter candles only, while a burner consuming seven and one half feet per hour gives the light of twenty-two candles, the pressure being uniformly four tenths of an inch.

"The knowledge of these facts is of importance to the consumer, who may, in his endeavor to economize, obtain results directly opposite to his anticipations. It is more economical to have one good large gas light than several small ones.

"GLOBES, GLASSES, ETC.—Although chimneys are essential to argand burners, and globes also in many places where fish-tail burners are used, and the ornamental effect is pleasant, still they are detrimental to the diffusion of the light of gas. A clean glass globe obstructs about 12 per cent; A clean globe engraved with flowers about 24 per cent; a globe ground all over about 40 per cent; an opal globe about 60 per cent.

Hence is apparent the folly of using elaborately engraved and ground globes or shades, where it is desirable to economize. If engraved at all, the upper portion should be embellished, while the lower part should be left clear for the free passage of light.

Curious Facts About Spiders.

Some very curious observations regarding spiders have lately been communicated to the French Academy of Sciences by Father Babaz, who has been fifteen years engaged in these researches. It happened one day, as he was reading in a garden, that a small spider suddenly lighted upon his book, and crawled over the very line he was reading. He tried to blow it away, but instead of letting itself be carried away by the blast, it raised its abdomen, and swung itself up to a leaf overhead. This appeared strange, as there was no thread to be seen. Our observer caught the spider again, put it upon his book, and repeated the experiment, which ended in the same result. He caught it once more, and this time placed himself directly in the sun, with the insect on a level with his eyes. In this position he at length discovered the evolution performed by the little creature. On receiving the blast, it raised its abdomen, and in so doing projected a thread of inconceivable tenuity to a considerable distance and, raising itself in the air, disappeared from view. This unexpected discovery induced Father Babaz to examine the question thoroughly; every spider that came in his way had to contribute something toward his researches, and in this way he at length ascertained a fact hitherto unknown to naturalists, viz: that most spiders possess not only the faculty of spinning a thread, but also that of projecting one or several, sometimes of a length of five or six meters, which they use to traverse distances with, and affix their thread to a second point for the support of their web. They even seem to have the power of directing the extremity of the ejaculated thread to a given point; they seem to feel for the place where is most desirable to fix it. Certain spiders, the Thomisa Bufo, for instance, will eject a bunch of threads which curling up in the air, and shining in the sun with various hues, give the insect the appearance of a peacock displaying its tail. But this is not all; spiders can fly and swim in the air, though they are heavier even than alcohol. To perform this feat they turn their back to the ground, and keep their legs closely folded up on their body, and in this posture sail about with perfect ease. Their flight is often very rapid, especially in the beginning, and they will sometimes escape from the observer's hand quite suddenly, and soar up high in the air.

How to Shave Without a Razor.

In looking over some old English patents, we came across the following amusing document, to which we suppose the Great Seal of the realm, consisting of a pound of beeswax, was attached, by means of red tape, in the usual manner. The inventor ought to have included the right to clean hogs before killing, in this manner.

Specification of the Patent granted to Marcus Hymans, of Exeter street, Covent Garden, in the county of Middlesex, England; for a Composition for Shaving without the Use of Razor, Soap or Water. Dated February 7, 1804.

To all to whom these presents shall come, etc. Now know ye, that in compliance with the said proviso, I, the said Marcus Hymans, do hereby declare, that the said composition for shaving, as aforesaid, is prepared and used in the manner following—that is to say: Mix one pint and a half of clear lime-water, two ounces of gum-arabic, half an ounce of isinglass, an eighth of an ounce of cochineal, a quarter of an ounce of turmeric-root (made into powder), an eighth of an ounce of roach allum, an eighth of an ounce of salt of tartar, and an eighth of an ounce of cream of tartar, together; boil them for one hour at least (stirring up the mixture during the whole time of boiling, and being careful not to let it boil over), clear it through a sieve; then add two pounds and a half of iron pumice-stone, finely pulverized; mix the whole together, with the hands, into one cake, by the assistance of the white of two eggs, well stirred up. Then divide the cake, so made, into twelve smaller cakes; dry them in the open air for three days; put them into an oven of moderate heat for twenty-four hours, when they will be completely dry and fit for use. Apply them with a gentle friction to the beard, and they will produce the complete effect of shaving

In witness whereof, etc.

EIGHTEEN million letters were collected from the lamp-post boxes of New York last year, and about the same number were delivered by carriers.

THE black pepper tree has been successfully raised to bearing maturity in many parts of California.

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Editorial Summary.

BEET SUGAR IN GERMANY.—A German agricultural journal gives an interesting account of the beet sugar business in that country. Fields of beets of from two to three hundred acres are often seen there. The beets are drilled in rows about fifteen inches apart and the whole labor of cultivation performed by the hoe. The women and men work in gangs of twenty or more. The men get from sixteen to nineteen cents per day and the women from thirteen to fifteen—working fourteen hours. The manufactories for this sugar are on a correspondingly large scale, some of them employing a thousand hands. The beets are brought from the field and elevated to the upper story of a high building, where they are cleaned, crushed, and filtered, the juice descending from story to story, undergoing a refining process by the way till it reaches the lower one in the shape of a sugar cone two and a half feet in length. It is a very nice article and worth at the factory about ten cents per pound. It takes eight days from the time of crushing the beets till the sugar is dried sufficiently for market. One of these establishments turned out six millions of pounds last year with the help of six hundred hands.

THUNDERBOLTS AS REMEDIES.—An English writer argues that several physical maladies can be cured by lightning. The doctrine that "like cures like," holds good, he asserts, in the case of maladies to which the destructive element gives birth; whether the fright, or some proper action of the electric fluid works the cure, it is hard to say, but the fact is incontestible. Several cases are reported where individuals paralyzed from their youth have recovered complete use of their limbs by lightning strokes in after years. A country clergyman in Kent was paralyzed by apoplexy in 1761, and struck by lightning about a year after, when all traces of the paralysis left him. A man who had lost the use of both arms was guarding some animals in a field; lightning fell upon him, and when he came to his senses he found that he could use both arms and hands. These are but a few out of many recorded instances. A variety of ailments besides paralysis have been cured or ameliorated by the same agency, even blindness; for one Gardley, some time an actor at the Surrey Theater, who had been for many years blind of one eye, had his sight quite restored by a lightning flash.

POWER OF A GROWING TREE.—Walton Hall, England, had at one time its own corn mill, and when that inconvenient necessity no longer existed, the mill stone was laid by in an orchard and forgotten. The diameter of this circular stone measured five feet and a half while its depth averaged seven inches throughout; its center hole had a diameter of eleven inches. By mere accident some bird squirrel had dropped the fruit of the filbert tree through the hole on the earth; and in 1812 the seedling was seen rising up through that unwonted channel. As its trunk gradually grew through this aperature and increased, its power to raise the ponderous mass of stone was speculated upon by many. Would the filbert tree die in the attempt? Would it burst the mill-stone? or would it lift it? In the end the little filbert tree lifted the mill-stone, and in 1863 wore it like a crinoline about its trunk; and Mr. Waterton used to sit upon it under the branching shade.

PRESERVATION OF BUILDING STONE.—An Illinois architect has invented a process for preserving from decay and disfigurement the beautifully colored stone called "Athens marble," which is now used very extensively at the West for building fronts. This stone is composed principally of carbonate of lime, carbonate of magnesia, and silica, but among the minor ingredients, protoxide of iron pervades the whole mass, giving the characteristic blue-greenish tint, the main cause of its beauty, but the cause also of its decay, as exposure to the atmosphere converts the protoxide into hydrated sesquioxide of iron, or iron rust. To remedy this action the stone is coated with a soluble glass, made by melting a mixture of fifteen parts of silica, ten of soda, and one of charcoal, until it forms a glass which is reduced to the liquid form by boiling in water. This solution permanently fastens itself to the surface and protects the stone from the atmosphere, smoke, and dust.

PHYSIOLOGICAL ACTION OF ALCOHOL.—The same observer has propounded a physiological law relative to alcoholic fluids, which is to the effect that the period of time required by these bodies to produce their effects, and the period of time required for recovery, turned altogether on the boiling point of the fluid used. This is so certain that the boiling point and action of one fluid being known, the action of any other fluids might be predicted from their boiling point. The explanation is simply that the alcohols taken into the body are not changed in their chemical composition, and their evolution and time of evolution are the mere matter of the expenditure of force, caloric, to raise them and carry them off. The practical lesson to be drawn is, that in case of alcoholic poisoning of the human subject, the most important condition for recovery is a high temperature.

EXTRACTING INDIGO FROM RAGS.—A French patent has been allowed for a new method of recovering indigo from cotton or woolen rags which have previously been dyed with that substance. The inventor places the rags in a boiler provided with a double bottom and saturates them thoroughly with a solution of caustic soda of 1° Baume. After this the rags are kept for five hours under the action of steam at 45 pounds pressure. By this treatment the indigo is reduced, and dissolved, then precipitated from the soda solution, and finally collected in as pure state as the best sorts in commerce.

DEATH BY FIRE DAMP.—Dr. B. W. Richardson, F. R. S., in investigating the physiological action of the methyl compounds, has particularly observed the action of the hydride of methyl, which occurs naturally in the form of fire-damp in mines, and as marsh gas on land. Seeking first to ascertain what percentage would prove fatal in the air, he found that even pigeons could live in an air charged with thirty-five per cent of the gas, for half an hour. When death finally ensued, it came as a sleep, so gentle that it was determined with difficulty when either circulation or respiration ceased. From these observations he concluded that the victims of a mine explosion die an easy but prolonged death, and while the knowledge of the first of these truths should inspire thankfulness, the latter should encourage the rescuing party not to abandon their exertions even for days after the accident has occurred.

THE RAMIÉ PLANT.—We have received from Mr. A. B. Bacon, chairman of the Section of Agriculture, New Orleans Academy of Science, a specimen of fiber made from this plant, which is beautifully white and fine, and certainly very strong. The accompanying circular asserts that the plant may be started with root cuttings, and will flourish in any climate where the ground does not freeze over a foot deep, and never needs replanting. Well rooted plants will produce from two to five cuttings of the stalk in a year, each giving 150 pounds of fiber to the acre. A native of Java, the plant has been domesticated in Mexico by D. Benito Roezl, a Belgo-Austrian botanist, who has also invented a machine for cleaning it. Any further information may be obtained from Mr. Bacon, at the *Picayune* Office, N. O.

MOCK SUNS.—The inhabitants of Lee county, Va., were lately much excited over the rather uncommon spectacle of apparently three suns rising at the same time. The central orb was encircled by a beautiful iris, surmounted by the fragment of another one, which extended on either hand above the attendant suns. After a brief space, these latter dissolved, leaving the only original Sol in the enjoyment of his full glory. The phenomenon, while it lasted, was a subject of dismay and affright to the ignorant populace, who considered it as certainly portentious of coming evil.

A NUMBER of illustrations of excellent inventions, intended for this issue, are necessarily left out to make room for our Spanish correspondent's letter, and other interestsng matter, which could not be deferred.

How Muskrats Swim Under the Ice.

Muskrats have a curious method of traveling long distances under the ice. In their Winter excursions to their feeding grounds, which are frequently at great distances from their abodes, they take in breath at starting, and remain under the water as long as they can. They then rise up to the ice, and breathe out the air in their lungs, which remains in bubbles against the lower surface of the ice. They wait till this air recovers oxygen from the water and ice, and then take it in again, and go on till the operation has to be repeated. In this way they can travel almost any distance, and live any length of time under the ice. The hunter sometimes takes advantage of this habit of the muskrat in the following manner:—When the marshes and ponds, where the muskrats abound are first frozen over, and the ice is thin and clear, on striking into their houses with his hatchet, for the purpose of setting his traps, he frequently sees a whole family plunge into the water and swim away under the ice. Following one of them for some distance, he sees him come up to renew his breath in the manner above described. After the animal has breathed against the ice, and before he has time to take his bubble in again, the hunter strikes with his hatchet directly over him, and drives him away from his breath. In this case he drowns in swimming a few rods, and the hunter, cutting a hole in the ice, takes him out. Mink, otter, and beaver travel under the ice in the same way, and hunters have frequently told me of taking otter in the manner I have described when these animals visit the houses of the muskrat for prey.—*Trapper's Guide.*

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The largest pumps ever made in the United States have just been completed for the San Francisco Dry Dock Company. The casings of the pumps are ten feet in diameter. The weight of the material in each pump is 75 tuns. They are calculated to raise 504,000 cubic feet, or 16,150 tuns of water, and free the dock in two hours.

Something entirely new in the manufacture of porcelain has been introduced in a Philadelphia factory. The new material is called "hot-cast porcelain," for while containing the ingredients of which porcelain is composed, it is worked like glass, and like the latter it can be blown, pressed, or rolled into any desired shape.

The experiment of laying steel rails on different sections of the New York and New Haven railroad, has been so satisfactory that the whole line is to be relaid with them, and as a beginning, an order has been sent to a firm in England for two thousand tuns. Several new passenger coaches, of the English pattern, are now building in Springfield for this line, and will be put upon the road during the present month. Each carriage will have five apartments, separately accommodating seven passengers, and the method lately introduced for heating cars by circulating hot water in pipes, will be adopted on these coaches. It is not a little singular that while we are introducing these apartment carriages, some of the English roads are, or contemplate doing the same with our long American cars.

Philadelphia modestly claims to have the largest military goods manufactory, the largest chemical factories, the largest bookselling house, and the most extensive locomotive works and machine shops in the United States In the year 1866 her factories produced over $200,000,000 of staple goods. Philadelphia is now the commercial center of 260 cotton and woolen factories, and has besides several thousand hand looms, of which the yearly product, it is asserted, is equal to that of seventy additional mills of average size.

It is stated that arrangements have been made for a projected railroad from St. Paul, Minn., to the western extremity of Lake Superior, distant one hundred and fifty miles in a nearly direct line. Seventy-five miles will be completed this year, and the whole by the end of 1869.

The Panama Railroad, during the twelve years of its existence, has transported only 396,032 passengers, but the treasure carried during that period exceeded $500,000,000 in gold, $147,000,000 in silver, $19,000,000 in currency, and $5,000,000 worth of jewelry. The tunnage of general merchandize exceeded 600,000,000, but it appears that the increase in outlay which this heavy traffic required, for wharves, rails and locomotives, has caused a falling off for the past year in the proportion of nett receipts, as compared with previous years.

The Moscow *Gazette* publishes a telegram from M. Bogdanywitch, a prospector now making a journey of exploration in Siberia, to look into the expediency of building a railway in that immense province. The adventurer is very favorably impressed, and asserts that information he has gathered shows by facts the brilliant future reserved for the Siberian railway. It is now announced that on the commencement of spring, operations will begin upon the first division of the great Russia-China-Taschkent Railway.

SHIP LEAKING INDICATOR.—Shaler's patent bilge water indicator, with Brevoor's improvement, was recommended by the commission appointed a few months ago to investigate the appliances for saving life at sea. It is very simple in construction, and operates on the same principle and by nearly the same means as an ordinary steam gage. A dial plate, over a box resembling a steam gage, shows an index pointer which is operated by the compression of the air in a tube. From the valve inside the case one or more pipes, either flexible or rigid, descend to the bottom of the vessel and terminate in a lead or iron pipe of larger diameter, the bottom of which reaches nearly to the skin of the ship. The rise of water compresses the air in the tubes, and, by means of the valve inside the case and simple connecting mechanism, operates the index, thus denoting by figures on the dial the depth of the water in feet, inches, and their fractions. An independent pointer outside the glass of the dial serves to denote the relative increase or diminution of the water in pumping. One single instrument, located in the binacle or pilot house, will, by means of branch pipes, denote the state of the water in two or more portions of the ship.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

SNOW PLOW.—Chas. Lusted, New York city.—This invention relates to a new plow for cleaning railroad tracks from snow, and consists in the use of an oscillating plowshare, which throws off the snow that has been raised by it, so as to prevent the accumulation of the snow upon the share. The oscillating share is hinged to a stationary lower share, and is connected with a crank on the axle or the truck, to which the device is secured. By means of a clutch arrangement the connection between the axle and the share may be established or interrupted at will, so that the upper hinged share may remain stationary if desired.

SCRAPER ATTACHMENT TO CARS.—E. B. Wells, Northampton, Mass.—The object of this invention is to provide railroad cars with a device for keeping the track clear of snow, mud, and other obstructions. The device is chiefly applicable to street or horse-cars and consists in the use of scrapers or plows, one in front of each wheel, which are suspended from powerful springs, that are attached to the underside of the car platform, which are operated by levers arranged at each end of the car.

CULTIVATOR.—Edwin Doolittle, Pawnee, Ill.—This invention has for its object to furnish an improved cultivator, simple in construction, effective in operation, and which may be easily and conveniently guided when at work.

KNITTING MACHINE.—John Chantrell, Bristol, Conn.—This invention relates to a new knitting machine in which a flat web can be knit by the aid of two sets of hooked needles, and by suitable sinkers playing up and down between the horizontal needles. The yarn is taken from one single spool, and is, by a suitable carrier, laid over the bodies of the horizontal needles, and is then between the needles depressed by the sinkers, the loops thus formed are cast off over the ends of the vertical needles upon loops held between the vertical and horizontal needles, and are thus locked. The invention consists chiefly in the peculiar manner of forming the loops by the two sets of needles and by the sinkers, and in the construction and arrangement of the devices by which the yarn guide, the needle carriers, the pressers, and sinkers, are set in motion in the required order and succession.

WATCH.—Geo. A. Bowen, Trenton, N. J.—This invention relates to a new device for protecting the drum in which the mainspring is contained and also the adjoining gear wheels and pinions from being injured by the breaking of the mainspring.

COMBINED FODDER CUTTER AND CORN SHELLER.—C. R. Hewett, Waupun, Wis.—This invention has for its object to furnish a machine by means of which corn may be shelled or fodder cut, as may be desired with equal facility.

BROOM OR BRUSH HOLDER.—Anthony G. Davis, Watertown, Conn.—This invention has for its object to furnish a neat, cheap, simple, convenient and effective device for holding a broom or brush suspended when not in use.

PLOW.—James Urie, Evansville, Ind.—This invention has for its object to furnish an improved plow simple in construction, effective in operation, which can be manufactured at small expense, and any part of which can be easily renewed when worn without its being necessary to send the entire plow to the manufactory to have the renewed part fitted.

HAY CUTTER.—J. F. Hammond, North Sudbury, Mass.—This invention has for its object to furnish an improved hay cutter which shall be self-feeding and double-acting, and which will do its work quicker and better than the hay cutters now in general use.

MARKER FOR SEWING MACHINES.—Joseph P. White, Savannah, Ga.—This invention consists chiefly in a new manner of attaching an adjustable cloth presser to an adjustable gage, so that the same can be set more or less to the front as may be desired, and so that the presser can be raised and lowered at pleasure. The invention also consists in a new manner of constructing a hemmer and of attaching the same so that it can be moved to form the gage, as may be desired.

FEED GUIDE FOR PRINTING PRESSES.—C. Potter, Jr., Westerly, R. I.—This invention relates to an adjustable feed guide for printing presses, and has for its object the facilitating of the adjustment of the guide, one screw only being manipulated in order to admit of the guide being adjusted in two different directions which are required.

CYLINDER PRINTING PRESS.—C. Potter, Jr., Westerly, R. I.—This invention consists in hanging or arranging the cylinder of that kind of printing presses known as the "drum cylinder," in such a manner that the cylinder may be raised, at the will of the operator, so as to be inoperative or incapable of giving any impression. The object of the invention is to give the operator or attendant entire control over the pressure cylinder, so that, in case of a sheet of paper being improperly set or presented to the cylinder, or the failure of a sheet being presented to it at all, the pressure cylinder, by being raised, will obviate many difficulties attending the above-mentioned contingencies.

PAD CRIMP OR PRESS.—George Kennedy, Clarksville, Iowa.—This invention has for its object to furnish an improved instrument by means of which the back pads of harness may be easily and accurately formed, so that the pad may be stitched with as much readiness as a piece of plain leather.

MACHINE FOR SAWING LATHS.—Emery T. Wheeler and Wm. H. Vaughan, Cannelton, Ind.—This invention relates to a new and improved machine for sawing lath, pickets, and strips for wheel spokes, chain stuff, etc., directly from the circumference of the log, without waste.

HAND LEVER SEWING MACHINE FOR PATCHING BOOTS, ETC.—David Forest, Eastport, Me.—The nature of this invention consists in a device for sewing patches on boots and shoes, and other similar articles, by means of a hand lever to work the needle.

TIRE SHRINKING MACHINE.—James Elliott, Milford, Wis.—This invention relates to a device for tire shrinking, and consists of a platform and bed piece, the latter supporting two sliding carriages carrying a notched or toothed flange, against which the tire to be shrunk is set, and held in place by two notched or ratchet cam levers, mounted on the same carriages, which are pressed together by one or two other cam levers, hung on vertical axes on the bed piece, thus shrinking the tire.

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LOW WATER ALARM.—F. S. Davenport, Jerseyville, Ill.—This invention relates to a new and improved device for ascertaining the hight of water in a steam boiler, and it consists in operating a valve by a float, whereby an alarm is given when the water in the boiler falls below the required quantity.

MIXING STEEL AND IRON.—James Cartwright, Youngstown, Ohio.—This invention relates to a new and improved method for combining steel and iron, whereby a greatly improved article is produded, as regards its tenacity, flexibility and strength.

HAY FORK.—Joseph H. Walker, Grand Rapids, Mich.—This invention relates to a new and useful arrangement, whereby the labor of handling hay is greatly lessened, and it consists in a fork of peculiar construction, which is attached to an irregular shaped frame, and so arranged that the position of the fork can be varied.

GRAIN MEASURING APPARATUS.—E. O. Melvin, Brooklyn, Wis.—In this invention the main feature is a lubricated shute provided with a gate which alternately closes one or the other branch of the shute, and which is connected with a registering apparatus that records the number of times the gate has been opened and closed.

SHINGLE MACHINE.—David L. Peacock, Rockport, Ind.—In this invention the shingle is split from a block, and planed while passing through the machine.

PRESERVE JAR.—F. J. Shefferly, Detroit, Mich.—This invention relates to a new and improved method of manufacturing jars for preserving fruits and other articles of diet of a similar nature, and it consists in the noveland improved method of sealing or securing the cover of the jar to the neck.

BOLT CUTTER.—E. A. Sloat, Theresa, N. Y.—This invention has reference to a new and improved method of cutting off the ends of bolts and rivets, an operation which has hitherto been performed by means of a cold chisel and hammer, and the invention consists in the arrangement of two cutters, the edges of which are operated in regard to each other like shears, but upon one of which cutters a compound lever purchase is obtained.

SPRING BED BOTTOM.—Gottlieb Koenig, Plymouth, Mich.—This invention relates to a new and improved method of constructing the bottom of spring beds, and the invention consists in an arrangement of bars and springs within the bottom, whereby the action on the springs serves to expand them instead of compressing them, thus preserving their elasticity and usefulness for a long period.

HAY KNIFE.—Charles A. Fisher, Geneseo, Ill.—This invention relates to a new and improved method of constructing or shaping knives for cutting hay, whereby the same are rendered more convenient in handling and more effective in operation than hay knives have hitherto been.

HORSE POWER HAY FORK.—Charles E. Gladding, Troy, Pa.—This invention consists in attaching to the handle and to the bait of the fork a jointed connection, formed of different parts or sections, which in the different positions the fork assumes as it is used in elevating and discharging the hay, places it entirely under the control of the operator, and greatly increases the value and usefulness of the invention.

SPRING BED BOTTOM.—S. J. Wingate, Decatur, Ill.—This invention has for its object to furnish an improved spring bed bottom, simple in construction, not liable to get out of order, and which may be readily attached to and removed from the bedstead.

CULTIVATOR.—C. A. Harper, Wheeling, Ind.—This invention has for its object to furnish an improved cultivator, so constructed and arranged as to remove the clods and rubbish in front of the plow, so that they may not be thrown against or upon the small plants being cultivated, and which will enable the plows to be much more easily raised to pass over stumps and other obstructions, and to be more easily transported from place to place.

LOCKING CAR SEATS.—Geo. R. Bayley and Jno. McCluskey, Algiers, La.—This invention relates to an improvement in locking and unlocking the reversible seat backs of railroad passenger cars, whereby all the seat backs on one side of the car can be locked or unlocked simultaneously.

DOOR HINGES.—Charles Dupré, Louisville, Ky.—This invention relates to an improvement in door hinges, and consists in a metal plate countersunk in the door, coinciding at the top of the door with a similar plate in the rabbet of the door frame, each furnished with projecting arms or ears connected by a pin; at the bottom of the door is a similar eared plate. A screw passing through the ear into a socket completes the hinge and renders the door adjustable in place.

TIRE SHRINKER.—Edward B. Decker, Bedford, Ill.—This invention has for its object to furnish an improved machine for shrinking tires, which shall be simple in construction, convenient to be used, and powerful in operation.

JOURNAL BOX.—Geo. H. Henfield, San Francisco, Cal.—This invention relates to improvements in the construction of bearings for railroad car axles or other journals, and consists in forming a brass or other metal attachment in connection with a cast iron box or shell, in such manner as to hold securely in place sections of Babbit or other soft metal for the bearings.

THREE-HORSE CLEVIS.—E. M. Potter, Kalamazoo, Mich.—This invention consists of a clevis provided with two grooved pulleys cast together and of unequal diameters; the chain from the doubletree winding on the smaller pulley, and that of the singletree winding upon the larger one, by which means a compensatory action is set up which enables three horses to be worked abreast in plowing or other equivalent work.

UTERINE ELECTRODE AND ABDOMINAL SUPPORTER.—A. J. Steele, New York city.—This invention relates to the application of electricity to the uterus and vagina when the latter are in different pathological conditions. It consists of insulated wires bent in suitable shapes and covered with a sponge or other equivalent substance for providing a medium of conduction from the insulated wire to the diseased part.

ICE SLEIGH.—John Rancevau, Carthage, N. Y.—This invention has for its object to furnished an improved ice sleigh, so constructed and arranged as to be propelled rapidly and conveniently over the ice by those riding in said sleigh.

TINMAN'S FORMING MACHINE.—Wm. Stine, Elmore, Ohio.—This invention relates to an improvement in a tinman's forming machine, and consists in a gage attached thereto for flaring cylinders or tubes at the end.

BAG FASTENER.—Daniel Overholtzer, Polo, Ill.—This invention relates to an improved device for fastening the mouth of a bag of grain or other commodity, and consists in an iron hook pivoted to a link, and so arranged in connection with another link through which it passes that by moving in one pivot the bag is fastened with a cord attached to both links, and by moving in the opposite direction the bag is unfastened.

ENDLESS CHAIN REVERSIBLE POWER FOR DRAWING CARS, ETC.—W. McCreery, Pittsburgh, Pa.—The object of this invention is to move cars or other heavy objects in and out of a depot or storehouse where steam power is located, by attaching a reversible gear to be connected when required with the thing to be moved.

MACHINE FOR BRAIDING WHIP LASHES.—Phineas L. Slayton, New York city.—This invention relates to an improved machine for braiding whip lashes, of any required number of strands, and it consists in a stationary hollow sphere open at top and bottom and supported between top and bottom plates by standards, which hollow sphere is cut up into segmental pieces or sections with channels or open passages between them to serve as guideways for a series of fingers that are moved around to lay the strands by means of segments of an external sphere or shell, which revolve on their own independent axes on opposite sides of the internal sphere, in pairs at angles to each other.

BUCKWHEAT HULLING MACHINE.—Joseph Baysore, Freeport, Ill.—This invention relates to improvements in a machine for hulling buckwheat or other grain.

BORING AND FITTING THE FELLIES AND SPOKES OF A WHEEL.—Albert Brush, East Constable, N. Y.—This invention relates to an improved mode of boring the fellies of a wheel.

SPOOLS OR BOBBINS.—A. P. Holmes, Great Falls, N. H.—This invention consists in loading or weighting a wooden spool or bobbin such as is used in cotton and woolen mills, by applying a metallic sheathing to the cylinder, or an equivalent thereof.

FLOURING MILL.—Wm. Craig, Uniontown, Pa.—The object of this improvemen, in the construction of flouring mills is to dispense with the heavy, complicated, and expensive machinery in general use in small country mills, and provide a complete mill with two run of stones for both merchant and custom work, the machinery of which shall be simple and direct in its operation.

GRAIN THRASHING MACHINE.—John F. Skinner, Brasher Iron works, N.Y.—This invention relates to a new and improved means for operating or giving motion to the shoe which contains the grain screen; to an improvement in the construction of the grain and straw carrier; to an improved arrangement of a belt with a pulley and spring arranged in such a manner as to render a single belt efficient in driving the straw and grain carrier face and beater cylinder; and to the employment or use of friction rollers in connection with the peculiarly constructed grain and straw carrier, said parts being all so constructed and arranged as to possess important advantages.

HORSE RAKE AND TEDDER.—Frederick E. Nearing, Brookfield, Conn.—This invention relates to a combination of a horse rake and tedder, and it consists of a peculiar construction and arrangement of parts, whereby the device may, by a very simple manipulation, be readily converted from a rake into a tedder, and *vice versa*, and rendered capable of operating in either capacity equally as well as if made specially for either purpose.

BUCKLE.—Louis Elsberg, New York city.—The principal objects of this invention are, first, to unite the two loops of the buckle, the one for the attached strap, and the other for the buckling strap in such a manner that traction on them in opposite directions draws the bar of the tongue and the buckling loop into closer contact, and thereby holds the buckling strap the more firmly.

CULTIVATOR.—Joseph Widman, Panola, Ill.—This invention relates to a cultivator of that class designed more especially for cultivating corn and other crops, which are grown in hills or drills. The invention consists in a peculiar construction of the machine, whereby it may be readily converted from a riding or sulky cultivator into a walking cultivator, or one without a driver's seat, and a very simple and efficient cultivator obtained.

EXTENSION AND CLAMP CLOTHES POST.—George Dittenhaven, Napoleon, Ohio.—This invention relates to an improvement in clothes posts, and consists in a post working in a groove, and of a clamp for securing the line.

CORN PLOW.—S. H. Cox, and W. H. Pence, Mattoon. Ill.—This invention has for its object to improve the construction of corn plows or cultivators so as to make them more simple and durable in construction, and more convenient and effective in operation.

CULTIVATOR.—John W. Doud, Forestville, Iowa.—This invention has for its object to furnish a simple, substantial, durable, and cheap cultivator for putting in all kinds of grain sown broadcast, and for preparing the ground for winter wheat, which shall be so constructed as to economise time, labor, and seed, in putting in the grain, the machine destroying the weeds, and covering the grain uniformly, so that it can all come up.

WINDOW BLIND AND NETTING.—John R. Wharry, Moundsville, West. Va.—This invention relates to a new and useful improvement in the construction of window blinds, and in the construction, attachment, and arrangement of netting frames to the window casing, whereby the movable slats of blinds are more neatly connected, and more conveniently operated, and whereby the netting frames are more convenient, and more effectually prevent the intrusion of insects.

FRUIT JAR.—J. M. W. Kitchen, New York city.—The present invention more particularly relates to that class of fruit jars provided with a screw thread for receiving the top or cover.

RAILROAD SWITCH.—W. L. Rogers, North Cornwall, and W. E. Crane, New Britain, Conn.—This invention relates to a railroad switch of that class which are commonly termed self-acting, and which are operated by the cars. The invention consists in a peculiar mechanism employed to serve as a stop to prevent the casual movement of the switch, and in a mechanism employed for moving the switch.

GATE.—G. P. Stebbins, Sparta Centre, Mich.—This invention relates to a gate of that class in which certain appliances are used to admit of them being opened or closed under the weight of the vehicle which passes through them, and which are commonly termed self-acting. The invention consists in the peculiar means employed for operating or opening and closing the gate.

ATTACHMENT FOR PLOW.—William Bennett, Rushville, Ind.—This invention relates to an attachment for corn or cultivator plows, for the purpose of preventing the mold board or share from casting clods of earth upon the plants during the process of plowing the same.

SAW.—George Walker, Middletown, N. Y.—This invention relates to an improvement in saws, both reciprocating and circular, whereby fixed teeth are made to possess all the advantages of the insertable teeth which are now coming into general use, and with far less expense, both as regards the first cost of the manufacture of the saw and the expense of keeping the same in perfect working order.

ENVELOPE.—F. Marion Shields, Macon, Miss.—The present invention consists in so forming an envelope that after having once been used it is susceptible of again being used by properly folding it therefor.

WHIP.—J. S. Cook, West Groton, Mass.—The present invention consists of an attachment to a whip stick for receiving and holding the lash portion of the whip, whereby the lash can freely turn upon the whip stick without winding around the stick as is now the case with the lash when secured to the whip stick by a string or strap.

STRAW OR HAY CUTTER.—A. J. Bell, Bloomingburg, N. Y.—The present invention relates to that class of hay or straw cutters the cutting blade of which is carried by a frame arranged to have an up and down motion in a vertical plane.

AUTOMATIC WATER GATE.—H. Besse, Delaware, Ohio.—This invention relates to a gate provided with certain devices which shall accomplish its opening and closing by the water of the stream which it spans.

DISH LIFTER.—D. E. Roe, Elmira, N. Y.—This invention is for the purpose of lifting hot plates or dishes from the top or oven of stoves. It consists of two wire claws affixed to a short wooden handle, one claw being made stationary and the other to yield against the tension of a spring.

SHINGLE MACHINE.—H. Woodman, Saco, Me.—This invention relates to a machine for sawing and planing shingles, and it consists of a rotary feed table, circular saw, and rotary planer, all arranged and combined to perform the desired work in a satisfactory manner.

HAY ELEVATOR.—Harvey McCown and Luther M. McCown, Little Beaver, Pa.—This invention relates to a device for elevating hay from wagons and depositing it in bays or mows, in bars or upon a stack. The object of the invention is to obtain a device for the purpose specified which will admit of the hay not only being elevated with facility but also being conveyed, after it reaches its highest point, over the spot where the hay is to be discharged.

WATER WHEEL.—George W. Wheeler and George V. Allen, Hartford, Vt.—This invention relates to an improvement in that class of water wheels which are keyed on a vertical shaft and work horizontally within a suitable case. The invention consists in a peculiar construction of the wheel and arrangement of the buckets, whereby a large percentage of the power of the water is obtained,

Business and Personal.

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W. R. Norris, Swanton Junction, Vt., wants the best Brick Machine, and Machines for jointing and crozing flat barrel staves.

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Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at 50 cents a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

H. A. M., asks "if the electric current produced by a Faraday magneto-electric machine will excite magnetism in a common electro-magnet formed of coils of wire around a horse shoe of iron." The common machines of this class give to and fro currents, that means the currents go (for every revolution of the coil) alternately in opposite directions and therefore produce only shocks, but neutralize the magnetic and chemical effects which electric currents moving in one direction only may produce; if, however, the magneto-electric machine is furnished with a so-called commutator, which is a contrivance reversing one current, and thus bringing them all in the same direction, it will magnetize a horseshoe, provided the wire in the coil producing the currents is not much thinner than that around the horseshoe. This principle has lately been applied in producing startling results in electrical science.

A. W., of Ind.—"How is the power of the wind estimated on a wind mill; by the actual weight of the air or the momentum? For instance, the wind is moving at the rate of 16 feet per second and strikes a surface of one foot square; would the mechanical effect be one lb. or 16 lbs.?" It would be neither. Wind moving at 22 feet per second exerts a force in pounds per square foot of 1.107.

J. S., of Miss.—If you wish to prepare your copal varnish so that it will be colorless, a little extra trouble will accomplish your object. Upon each piece of copal, drop a little rosemary oil, and select only such pieces as become soft on contact with the oil. These pieces are ground and passed through a fine sieve so as to be reduced to powder, which must then be placed in a glass and a corresponding volume of rosemary oil poured over it. After stirring the mixture it is transformed into a thick liquor, and after standing two hours a few drops of rectified alcohol is added and intimately mixed. Repeat the operation until the varnish is of the right consistency; finally decant the clear liquid. This varnish is adaptive to either wood or metals.

P. S., of Mass.—In the multitude of counsellors there may be wisdom, but when we receive in two weeks six communications on the "heptagon in a circle," five on "tides and their causes," eleven on the "solution of plane triangles," and thirteen on the "day line," we may be excused if we do not see the propriety of absorbing the room necessary to publish each one. We are grateful to our correspondents for their promptness in responding to suggestions made through our columns. We are always glad to receive them. but if their articles are not always published it should be attributed to the limits of our columns and not to boorish discourtesy.

A. J. H., of Mass., wishes to know how to galvanize cast iron. He treats his iron with acids to obtain a clean surface, and then plunges it in melted zinc, but is unsuccessful. There is some difficulty in galvanizing cast iron because of its irregularity of surface. Where the work is intended to be perfect and permanent, a deposit of pure iron by means of the battery is first given the casting. We presume that an ordinary coating may be obtained by simple immersion in the melted metal, which, however, should not be zinc only, but be composed of 202 parts by weight of mercury to 1·29 of zinc.

S. B., of N. Y., finds difficulty in tempering dies for a power hammer and asks how to make them stand. The dies should be of the best steel, and instead of being heated in an open fire should be packed in a cast-iron box with ground bones and heated gradually to a red, plunged into cold water, and drawn to a deep red inclining to blue. "Ede on Steel" is the best treatise we know of on hardening and tempering. It can be obtained at Appleton's, 445 Broadway, New York city.

S. W., of Conn., is making a lot of hollow steel punches, the hollow extending from the end up about seven eighths of an inch. He finds nine out of ten crack in hardening. Of course they will. The remedy is to drill a pin hole transversely across the body of the punch to meet the top of the hollow. This allows the steam to escape, and will entirely prevent the cracking while it will not materially weaken the punch. Indeed, all similar articles should be so treated before being hardened.

M. F. W., of Pa., cannot make a large pulley hold on the shaft. The key, although of steel and seated in a key-way or slot, "cuts into slivers" and allows the pulley to turn on the shaft. Our advice is to discard the key altogether, bore and tap one, two, or three holes through the hub, fit steel cup-ended screws, and no more trouble need be apprehended. These screws have a recess drilled at the end and the outside turned down on a bevel to the edge of the hole, making a circular edge. Then harden the end and insert the screw.

J. G. P., of N. Y.—The eccentrics of marine engines are secured to the shaft by three keys hollowed on the shaft side to fit the rotundity of the shaft. They pass through key-ways in the hub, and are held to the shaft by set screws passing through the hub and bearing upon the top of the keys. The keys are driven home and the screws set down on them. It is an easy matter to move eccentrics thus secured,

A. M. G., of Ark.—Raw hide is one of the most tenacious substances known. It is extensively used for pickers for looms, and in some parts of South America, where the climate is very dry, is preferred to iron for tiring wagon wheels. A recent application of it for window cords and dumb waiters manufactured by a firm in Williamsburgh, N. Y is proving a success.

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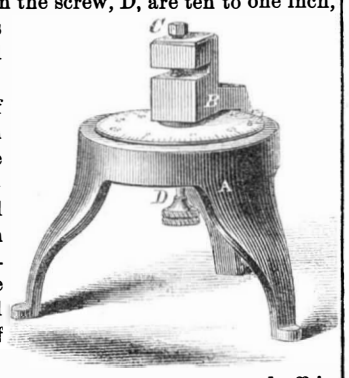
BROWN & SHARPE'S IMPROVED SHEET METAL GAGE.

The gages commonly used in measuring the thickness of sheet metal are not always accurate. Even if the fixed slots which determine the sizes were not subject to wear, the proper gage could be only approximately determined, as the edges of sheet metal are often imperfect—thinner or thicker than the body—and as their depth is very slight it is difficult to ascertain the actual thickness of the metal. The gage shown in the engraving is intended to give the thickness of metal up to one quarter of an inch, in thousandths of an inch, at some distance from the edge.

The stand, A, supported upon three feet, with an upright, B, is a single casting. In this upright is a space or slot. Above this space, in the upright, is an adjusting screw, C. Fitted into the lower part of the upright is a screw, D, with a milled head on the lower end. Attached to this screw and revolving with it is a German silver dial. The graduations on the edge of this dial are read off from an index point. The upper and lower screws are exactly in line with each other, and their points, which are hardened, meet in the space between the two. The threads upon the screw, D, are ten to one inch, and the edge of the dial is divided into one hundred parts.



With this explanation of the position and relation of the several parts of the gage, it will readily be perceived that when the metal to be measured is placed in the opening in the standard, and the screw, D, made to revolve until the metal is held between the ends of the screws, D, and the adjusting screw, then the exact thickness can be read off in thousandths of an inch at the index point. Should any wear of the points of the screws take place the point, "O" on the dial can always be kept exactly opposite the index point by means of the adjusting screw. A small binding screw with a piece of brass under its point serves to hold the adjusting screw firmly in its place when it is set correctly. The accuracy and simplicity of this gage will commend it to those who desire to obtain uniformity in the thickness of sheet metals or in thin material of any kind. It will be particularly useful to machinists, silversmiths, sheet brass and iron rollers and workers, and for many other purposes. J. R. Brown & Sharpe, of Providence, are the manufacturers.

A Naval Vessel Disinfected by Steam.

The Navy Department has received dispatches from Commander Chandler of the United steamer *Don*, dated Vera Cruz, Dec. 16. He states that the yellow fever broke out on board of his vessel on the 25th of November. It proved to be of a most malignant type. He was ordered to the above port, and on arriving there the ship was anchored with a "spring," and was always broadside to the wind. The sick were at once landed and their clothing and bedding aired. The ship was thoroughly impregnated with yellow fever. Commander Chandler caused the hatches of the berth-deck and ward-room to be securely closed. One joint of the steam-heater on the berth-deck was disconnected, and the same operation performed in the ward-room. A thermometer was lowered through a small slip in the tarpaulin, and, after two hours' steaming in the ward-room, it indicated 205 degrees, and on the berth-deck 170 degrees. The hatches were then opened, decks dried down, joints of steam heaters replaced, and in two hours more there was no indication of the extreme heat to which those places had been exposed. No cases of fever occurred afterward. We had 23 cases on board, and seven men died. Commander Chandler informs the Department that he is fully persuaded that heat eradicated the disease as effectually as a severe frost could have done.

Hardening Files.

A correspondent asks how to temper files without cracking. We cannot do better, unless some practical file maker comes to our aid, than to quote from Tomlinson's Cyclopedia:

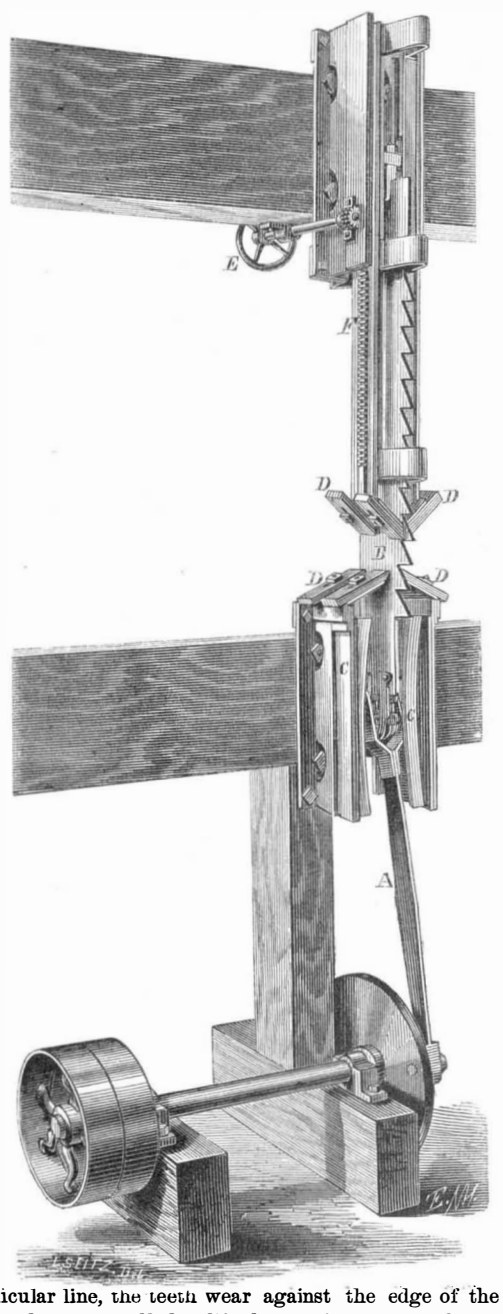
"Before being hardened the files are drawn through beer-grounds, yeast, or other adhesive fluid, and then through common salt mixed with roasted and pounded cow's hoof; the objects of which are to protect the teeth from the direct action of the fire and the oxidizing influence of the air; to afford an index of temperature, the fusion of the salt showing when the hardening heat is attained; and to lessen the tendency of the files to crack on being immersed in water.

"The files in the process of cutting become slightly curved, and it is necessary to straighten them before the hardening is completed. Some forms of file are apt to become curved in the act of hardening; such, for example as the the half-round file, which sometimes becomes hollow or bowed on the convex side; hence to produce a straight file it is purposely bowed, while soft, in the reverse direction. Most of the other forms of file are gradually heated to a dull red, and then straightened by striking them with a leaden hammer upon an anvil of the same material. A warped file is also in some cases straightened by being inserted between a couple of iron bars, fixed parallel a short distance apart, and then pressed in an opposite direction to the bend intended to be corrected. After the straightening, the file is placed in the fire again and heated until the salt fuses upon its surface; it is then immediately removed from the fire and plunged into a cistern of cold water. The method of plunging it into the water is of importance; it is held by the tang with a pair of tongs, and immersed quickly or slowly, vertically or obliquely, according to its form; that method being adopted which has been found by experience best calculated to keep the file straight. It is, however, very difficult to prevent some degree of set or curvature in quenching the files. Each file is therefore narrowly watched, and after being plunged once into the water, if any bending is observed, it can be remedied before the file is cold, by inserting it between the bars before mentioned, pressing upon it with considerable force, and lading the water upon it with the hand: considerable curves may be corrected in this way. It is, however, in some cases necessary to reheat the files, for which purpose they must not be placed in the forge fire, or the teeth would be injured now that the smearing has been washed off; they are therefore held over a clear fire, or placed on a heated iron bar or over a hooded gas flame, and when straightened are quenched in oil to prevent the teeth from becoming rusty. After the hardening, the tang is tempered by immersing it in molten lead, for if the tang were left as the file, it would be liable to snap off during use.

"The files are next scoured with scrubbing brushes dipped into sand and water or coke dust and water; they are next put into lime water, and left for some hours in order to get rid of every particle of salt. They are then thoroughly dried at the fire, rubbed over with olive oil containing a little turpentine, and are now considered as finished."

ANDERSON'S IMPROVED METHOD OF HANGING SAWS.

A large portion of the power employed in driving muley saws is absorbed by the friction of the blade in the log during its upward or non-cutting stroke. Where the saw, as is usual, traverses, in upward as well as downward stroke, a perpendicular line, the teeth wear against the edge of the saw kerf and are compelled to lift the cuttings or sawdust to the top of the log. When the feed is continuous and constant the friction and wear are greatly increased. A remedy for these difficulties is intended by the device seen in perspective in the engraving. The pitman, A, is not connected as in the ordinary method directly to the saw, B, but the fork extends above the buckle which connects the saw, B, and pitman, A, to pivots on the blocks that traverse the slides, thus making the pitman a lever having a long and short arm. This arrangement compels the lower end of the saw to be vibrated back and forth as the lower end of the pitman describes a circle. But the proper action of the saw requires that in making the downward cut or stroke it should descend in nearly a right line, while its movement in this respect in the returning stroke is immaterial. It is evident, however, that if the lever action of the pitman, as connected in this engraving, was allowed its natural play, the motion of the saw in both strokes would partake of the form of a parabola or curve. This would compel the saw, when arrived at its half stroke, to do a largely increased amount of work to that performed in any other part of the stroke. The inventor of this device exhibits his ingenuity just here. It will be noticed in the engraving that the slides, C, for the lower boxes are curved. The design of this beautiful mechanical arrangement is at once apparent. The convexity of this curve agrees exactly with the difference between the long and short arm of the lever, (pitman) A. In sawing, the downward stroke is performed by the movement of the crank from the upper center forward, and when the fulcrum, (upper) of the pitman in its descent passes the center of the curved slide it begins—following the sweep of the slide—to be carried forward, and with it the lower end of the saw; but just as it arrives at the center the lower end of the pitman is turning the forward quarter of the crank and is being carried backward. The curve of the slides and the difference of leverage in the pitman being the same—as before noted—the result is a nearly direct vertical motion. Thus the saw makes a direct downward movement in cutting (except just sufficient lead to insure each tooth a portion of the work) and as direct an upward movement on the return stroke. But after making the cut the saw is carried back from the kerf edge and rises in a part of the kerf unclogged by sawdust. When it begins to cut it is carried forward and cuts another stroke, carrying down all the sawdust made by the previous cut. The advantages of this arrangement are too palpable to require further elucidation. The saw has comparatively no friction in its upward strike and all the dust is sent under the log. With the old method a large log cannot be sawed without clogging, because a large proportion of the saw's length is continually in the log and the feed must be stopped occasionally to allow the saw to clear out the dust. With this, however, the saw makes the cut and then as it begins to rise recedes from the cut and rises where all is clear. The forward or increasing cut of the saw is another advantage compelling each tooth and every working part of the saw to perform its share of the labor. The adjustable guides, D, on the lower slides and the upper frame are to prevent the saw from "buckling." The upper set can be lowered by the rack, pinion, and hand wheel, E, to suit the diameter of the log to be sawed. The slide in which the frame and feed rack, F, traverses, as it is raised or lowered, overhangs toward the tooth edge of the saw, so that at whatever height the upper frame and guide may be fixed, the overhang of the saw will be always adapted to the diameter of the log to be sawed.



These combinations make a very perfect arrangement for saw hanging. This device has been very thoroughly tested within six years past. Over five hundred are in operation in the Middle and Western States. The inventor claims that they will cut—according to size of timber—from 10 to 100 per cent more than the ordinary muley saw and with less power.

Patented January 17, 1867. Further information may be obtained by addressing Leonard Anderson, or Coe & Wilkes, Painesville, Ohio, or F. Muzzy & Co., Agent, Bangor, Maine.

Speculation not Necessarily Invention.

We frequently receive letters, ostensibly on scientific or mechanical subjects, that do not contain a single statement, fact, or even suggestion which can be made of the slightest use. The writers seem to suppose that words without ideas possess some intrinsic value. Speculation on future improbabilities—if such a term may be allowed—is the form many of these communications assume. Such writing is the easiest of all possible styles, and the most nonsensical and unprofitable. Suggestions of mechanical improvements may be valuable. If the writer does not see their possible tendency some wide awake mind may seize upon them, and make them practical, living realities. But speculations on what could be possible only if man were almighty, and the laws of nature could be defied or abrogated at will, are a useless waste of mental power, or rather of words.

Such we regard the communication of a correspondent, who says:

"You complain of steam, and not without cause. I have an ideal future, in which steam has but little to do; would you like a peep at it? There you would see the Niagara, and other falls, improved water powers, driving armatures which generate currents of electro magnetism; these currents conducted all over the country by insulated wires, each workshop, factory, and even private dwelling, thus supplied with motive power. The magnetic engine is everywhere, steam has fled! Another peep; further still; changed again! Niagara rolls in its ancient grandeur, and turns no noisy wheel. The network of wires is gone, but the busy hum of the factory is as loud as ever. There must be a motor, certainly; don't you admire its beauty? Gravitation, and one or two of nature's simplest laws, are working in concert, and produce, inexpensively, all the power required. There is no troublesome shafting—little wires to each bench prove themselves equal to the work; and fully as effective at the furthest point as at the nearest.

"How do you like it? Is it impossible? If any one thinks so, let him study, carefully, the points to him most improbable; and if still incredulous, state his reasons fully to me, and I will demonstrate to him not only its possibility, but the probability of my ideal soon becoming the actual real."

[Our correspondent queerly unites the "busy hum of the factory" with the absence of shafting. His "demonstration" of its possibility would not be less surprising than his bare statement.—EDS.

THE CANADIAN MONSTER CHEESE, having survived a course of exhibitions at agricultural fairs in the United States, we find from a notice in a Liverpool paper, has safely crossed the waters and is now being gazed upon by the curious in that city. The cheese is of factory make, is about eighteen months old, and weighs 7,000 pounds.

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HEAT POWER---ITS VALUE AND WASTE.

Our mechanics are becoming convinced that a broad field for improvement is opened to them in providing against the enormous waste of force caused by the insufficient means by which we generate motive power from heat. To this end the attempts of our inventors are directed in the various forms of steam generators, which so frequently become the subjects of patents. Heat is the best reservoir of power yet known to the mechanical or the scientific world. But the larger proportion of the heat evolved in the combustion of fuel is lost or wasted, whether that combustion is employed in generating steam for boilers or warming the atmosphere of rooms. In our best steam generators the percentage of heat force rendered available as a motive power, compared with the amount of fuel consumed, and the amount of latent heat force known to reside in the fuel, is ridiculously small. We seem to be, in regard to the utilization of the products of combustion under our steam boilers, but a trifling degree removed from the attempts of the last generation to heat their dwellings. From the old-fashioned fireplace, with its heap of wood burning at the base of a capacious chimney, which exacted the larger part of the heat, to the elegant heat-saving stoves, furnaces, and ranges, supplied with every appliance to extract the largest possible amount of heat in its passage from the fire to the outer atmosphere, is a large remove. In this direction a great deal has been done, and our dwellings are warmed and our dinners cooked with a tithe of the fuel which was required twenty-five or thirty years ago.

It may be doubted if so much progress has been made in this direction by our mechanical engineers. To be sure, there are instances where a steam generator of an improved style has shown marked advantages over those of the old make in the saving of fuel. But there is still room for much greater improvement in this direction.

The next great radical invention must be, it seems to us, something which shall enable us to use the means which nature has placed within our reach for the production of power, without letting eighty or ninety per cent of it slip through our fingers in the using. One obstacle to this is the attachment to old styles of boilers, which in the days of our fathers seldom exploded, simply because the internal pressure was but little above that of the atmosphere externally. To confine heat, or to rapidly generate heat in a reservoir, at a degree which shall render it the most effectual for the production of power, requires, not only a strong vessel (boiler), but knowledge of its powers and skill in its management. If these are wanting it is useless for inventors to exert themselves in contriving more efficient steam generators only to be blamed for the results of the carelessness of ignorant or underpaid employés who pay with their lives for the cupidity of employers. We need a steam generator which shall yield in available power at least the larger percentage of the heat employed for its production, and we believe this is within the bounds of mechanical skill and the limits of scientific knowledge.

ARE MODERN MECHANICS INFERIOR?

Not only in the social and the political world, but in the mechanical world, there are to be found many croakers, who are forever disparaging the present and praising the past—who are forever regretting the "good old times," and belittling the progress of the present. If they are directed to the progress made in the mechanic arts by the present generation, they will, at once, point to the vast improvements made in tools and labor saving machinery as the reason for that progress, without considering that these very improvements refute their statements, and render untenable their position. The saving of manual labor, the economy of time, and the perfection of results, are the objects aimed at by our present generation of mechanics, and they deserve as much credit for their attempts and successes in this direction as those who went before them do for their surprising patience and skill in manipulation. Taking the steam engine as an example of improvement, it is useless to deny that a first class machine of the present day is not a very superior machine to the best constructed under Watt's personal supervision. The principle may be the same, the motive power and its means of generation similar, but the results are widely different. The steam engine has become an economical machine, not merely a motor which could be used advantageously only where other power could not be made available, but one that stands in the front rank for economy, facility of handling, and regularity of speed under the most rigorous tests. The improvements to which this result is due are evidences of the inventive genius, patient investigation, and constructive skill of our modern mechanics.

The machines most used in iron manufactures are also illustrations of the fidelity of our present race of mechanics to their business. All of them, without exception, and almost every hand and bench tool, have been improved so as not only to facilitate the progress of work, but to add greatly to its accuracy. The turning lathe of only twenty-five years ago would be regarded now as a relic of comparative mechanical ignorance. The "shears," or frame of timber, with the ways of cast iron, mortised in, and planed or filed by hand; the hand chaser for screw cutting, followed by the hand-worked slide rest; these contrast strangely with the elegant engine lathes which turn a shaft, bore a pulley, or cut a thread, involving changes, which, however, may be made in a moment. The upright drill for boring holes through the hubs of heavy pulleys and gears, requiring only to be seated and trued on the revolving bed and chucked as nicely as though swung in a lathe, had no counterpart in the wearisome hand labor of hand boring, equaled in its monotousness and weariness by the convict's treadmill. The planer, obeying the will of the operator, who merely directs the work, is not much like the wearisome chipping and filing of the hard working mechanic of thirty years ago.

So we might go on citing cases innumerable to show that the mechanics of the present day are not a whit behind their predecessors in their attachment to their business and their anxiety to produce good work.

There are some virtues, however, possessed by our predecessors, we might do well to imitate. They worked in consonance with the maxim that "what was worth doing at all was worth doing well," one which, judging by some of the half finished jobs which sometimes vex the eye of the mechanic, we would do well to imitate. Another is that tenacity of purpose and patience of performance which after weeks of monotonous mechanical labor found its reward in a consciousness of a job well done. Still another is that determination to become a master of the business, by repeated and continued trials toward perfection in the use of tools, which left the mechanic master of the field.

Such a man was the late Ebenezer Winship, whose death we noticed in the closing number of the last volume. To him young mechanics resorted for instruction, especially in difficulties. His mechanical knowledge was not so much the result of his fifty years experience, as his frequent and perhaps compulsory requirement of meeting mechanical difficulties with what many present mechanics would deem insufficient means. He was a man for emergencies, and really it is in emergencies that the value and character of the true mechanic shine most brightly. These virtues, added to our superior facilities, ought to make our mechanics the equals of any who have preceded them, and examples to those who may come after.

THE "ANGOLA" ACCIDENT.

From a correspondent who signs himself "F. D. A., an employé of the Lake Shore Road," we have received a communication in which he states that it was a part of his business to make an examination into the cause of the late deplorable accident, and that contrary to our statement on page 25, No. 2, current volume, there was no broken flange on any of the wheels, but that a bent axle was the cause of the accident. He says that the engineer did not know the condition of the train, but obeyed the signals of the conductor in a proper manner. He thinks also that any safety brake, worthy the name, should be one which could be operated under the whole train at once, either by the engineer, conductor, or brakeman, as circumstances might determine, and concludes with the statement that the Lake Shore road employs as experienced and faithful inspectors as any road in the country.

To all of which we yield a hearty assent. But we did not state that a broken wheel was the cause of the accident, only that this was one of the causes assigned by others. When the article to which our correspondent refers was written the verdict of the coroner's jury that the accident was caused by a bent axle had not been rendered; that fact was published on page 41 of the succeeding issue of the SCIENTIFIC AMERICAN. We are not aware that any brake has yet been invented to act simultaneously on all the cars in a train and be operated by a person at any point on the train. We have cast no reflections on the management of the Lake Shore road; having traveled on it many times we have a high opinion of its condition and management.

Death of an Inventor.

Mr. Samuel Nicolson, inventor of the "Nicolson pavement," an improved steering apparatus for vessels, and several other inventions, died at the United States Hotel, Boston, on the 6th inst., after a brief illness, at the age of seventy-six years. He was a native of Plymouth, Mass. He held the office of superintendant of the Milldam Corporation, and secretary of the Water Power Company, for several years; was a useful member of the Boston Common Council of 1852-3, and was truly a thorough gentleman of the old school. The pavement named after its illustrious deceased inventor is becoming so popular in our cities that his name is likely to be known to posterity, as his memory will be respected by the present generation.

REPORT OF COMMISSIONER WELLS.

The second annual report of Hon. D. A. Wells, the Special Commissioner of the Revenue, contains facts and makes some recommendations which will be found worthy of note. Mr. Wells strongly urges a reduction in the expenditures for the army and navy and in other departments of the public service, and recommends that no money be appropriated for the further purchase of foreign territory. He says:

"With the substantial adoption on the part of Congress of an economical policy as above indicated, the ordinary expenses of the government might, it is believed, be immediately reduced to one hundred and forty millions per annum, which amount would even then be an excess of over 100 per cent on the ordinary expenditures of the fiscal year 1861. With a saving of from fifty to sixty millions per annum thus effected, a reduction of taxation to an extent sufficient to afford an immediate relief and stimulus to the industrial interests of the country, becomes at once practicable; and this even on the assumption that no increase of the Internal Revenue is likely to accrue from any improvement in the method of assessing and collecting taxes, or from the progress of the country in wealth and population. Thus, for example, a reduction in the annual expenditures of the War Department from $83,841,555, as in 1867, to sixty millions of dollars would allow a reduction of over 26 per cent on all the taxes now levied on manufactured products, exclusive of liquors, tobacco, and a few other articles generally classed under the head of luxuries, and still leave to the credit of this department for its increased necessities, growing out of a change in the circumstances of the country, a sum 260 per cent in advance of what was required in 1861. In like manner a reduction in the expenditures of the Navy Department from thirty-one millions, the requirements of the last fiscal year, to fifteen millions, would supplement all the present revenue derived from the following articles, and allow the taxes on the same to be entirely dispensed with:—All fabrics and manufactures of cotton; all manufactures of wool, including carpets and hosiery; or, all manufactures of iron and steel, including machinery, steam engines, &c.; together with hats, leather, and all manufactures of leather including boot and shoes, saddlery, harness and trunks; with paper of all kinds. Or, to put the case differently, if a reduction could be effected, of thirty millions in the expenditures of the War Department, of fifteen millions in those of the Navy Department, of fifteens millions in those of the Civil Service, with a discontinuance of any further appropriations for what may be called extraordinary expenditures, it would permit the removal, substantially, of nearly all of what are understood to be industrial taxes, and also offset the amount derived during the last fiscal year from the tax upon raw cotton.

In regard to the industrial condition of the country the Commissioner remarks that "immigration continues to flow with uninterrupted volume, at the rate of over 300,000 per annum; making a positive yearly addition to the wealth and producing capacity of the country of not less than one hundred and fifty millions of dollars: A continued increase in the invention of machinery, and the perfecting of processes for improving and cheapening products; as is more especially made evident by the returns of the Patent Office—the whole number of patents issued for the eleven months ending Dec. 3, 1867, being 10,907, as compared with 9,100 issued during the corresponding period of 1866, 6,220 for the entire year 1865, and 4,637 for the year 1864. This very remarkable increase must not, however, be accepted in its fullest apparent extent, as illustrative of substantial progress. It is so, undoubtedly, in great part; but, on the other hand, the real value of many patented improvements, as additions to the substantial wealth of the country, may well be doubted: An increase in the capital invested, and in the number and capacity of establishments for manufacturing purposes. In order to obtain some certain information on this subject, the Commissioner, at the commencement of the last calender year, instituted measures for collecting and recording such data relative to every department of industrial progress as were available. The results thus obtained would require a volume for their publication; and, although somewhat imperfect and miscellaneous in their character, they establish, nevertheless, beyond a doubt and in a most curious and interesting manner, the fact that great and substantial progress in manufacturing industry has been achieved in nearly every section of the country.

"In the manufacture of cotton, the amount of machinery at present in the country, and which is substantially engaged in the work of production, is from 15 to 20 per cent more than existed at the beginning of the war; while the export trade in coarse cottons, formerly (before the war), large, but afterward almost entirely lost, is now recovering with gratifying rapidity. In the department of woolen industry, notwithstanding the recent unusual depression of this interest, the erection of new mills has continued, with a reported general improvement in the character of the products.

"In the department of iron industry, the number of blast furnaces for the manufacture of pig iron, in operation during the past year, has been in excess of that of any former period while an unusually large number of new furnaces are now in process of construction.

"During the same period the rolling mills of the country

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were generally in continuous operation: new establishments of this character, and new and extensive works for the manufacture of Bessemer steel have also been erected; while a marked increase in the American product of ordinary steel is reported.

"The Commissioner would also, in this connection, call attention to the fact that, notwithstanding the almost continued reported depression of the iron interest in the United States, the average annual increase in the domestic product of pig iron is remarkably uniform, and greatly in excess of the ratio of the increase of population; the annual ratio of increase of pig iron, from 1850 to 1866, having been in excess of eight per centum, while that of population from 1850 to 1860, was about 3½ per cent; or, stated differently, the increase in the production of pig iron, from 1810 to 1866, was 2371 per cent, while that of the population was 410 per cent. The annual ratio of increase in the product of pig iron in the United States since 1855 has also been greater than in Great Britain.

"The increase in the production of anthracite coal (which may be taken as a measure of the production of all American coal), during the year 1866, was about three millions of tuns over the product of 1865, on a gross return for the former year of 12,399,747. This extraordinary increase was referred at the time, in part, to a speculative revival of trade and industry succeeding the termination of the war; and also to the stimulus of very high prices. These stimulants, however, if they were really influential, have clearly not operated in any degree during the past year, and yet the gross product of anthracite coal sent to market has not materially dimished; the deficiency up to the 30th of November, 1867, in the aggregate of coal sent eastward from Pennsylvania, having been only 170,041 tuns, as compared with the movement of the corresponding period of 1866; while the stock on hand at the various markets available for consumption, at the close of the season of 1867, was estimated at less by 250,000 tuns than the stock on hand at the close of the two preceding years. It seems, therefore, certain that the conditions of ability to consume—which conditions are mainly industrial—have not become impaired during the past year; or, in other words, the industry of the country has developed during the past year to such an extent as to render what in 1866 seemed abnormal and uncertain, now legitimate and permanent.

"The record of the export trade in petroleum for the last three years, has also been very similar to that of coal. Thus, for the years 1864 and 1865, the annual report of petroleum, with an advantage of a high premium of gold, averaged about thirty millions of gallons; but during the year 1866, the exports suddenly rose to an aggregate of over sixty-five millions; and this extraordinary increase, which originally might have seemed speculative and temporary, has during the past year been substantially maintained."

On comparing the financial condition of this nation with that of other governments, Mr. Wells gives the gratifying information "that the United States is the only one of the leading nations of the world which is, at present, materially diminishing its debt and reducing its taxes; and the only one, moreover, which offers any substantial evidence of its ability to pay its debt within any definite period, or even anticipates the probability of any such occurrence."

The language of the Report, with the very encouraging facts presented, which are fortified by detailed statements, will serve to inspire renewed confidence in an early return to a solid business prosperity, and incite to the development of enterprises which have been deferred only from the timidity of their projectors. We may have occasion hereafter to advert again to this document.

Finding the Deviation of the Compass.

The *Mechanics' Magazine* describes an invention designed to simplify the process for finding the error on the common steering compass, or, in other terms, the deviation of the magnetic from the true meridian. It has been patented by Major General Shortrede, of Lee, who attains his object by making some additions to the steering compass as usually made, by which it becomes virtually an azimuth compass, without interfering with its ordinary use in steering. One way of effecting this is by attaching at opposite sides to the rim of the cover a semi-circular arc or band of a convenient width, having along its middle a narrow slit, by means of which it may be directed to the sun or other heavenly body; or through which the sun's light shining over the center and on the edge of the card, shows by a bright streak on a dark ground the compass bearing by observation. This being compared with the bearing, determined astronomically, gives a difference, which is the error or deviation of the compass from the true meridian. On a surface projecting from the rim of the bowl, or on the rim of the cover, are graduations, which are read as usual by a zero mark on the other rim. When the sun's light is too faint to give a distinct streak, or in observations of moon, star, or planet, the object may be viewed through the slit, either directly, or as reflected from the glass of the cover beneath the slit. In such cases the observation is made by taking the usual reading of the card at the lubber line, and also the reading on the rim giving the angle between the lubber line and the object. According to their position, the sum or the difference of these readings gives the compass bearing of the object; and this compared with the true azimuth gives the error or deviation from the meridian

As a high wind acting on the continuous arc may cause the compass to have a tremulous motion, in order to avoid or lessen this inconvenience in such cases, the arc is removed and replaced on the side towards the object by a short piece about an inch high, and on the other side by a shorter piece, each piece having in it, as in the arc, a narrow slit. The piece towards the object being fitted with a reflector, which may be either of the usual sort with a hinge so as to be turned according to the altitude of the object, or it may be a portion (about an octant) of a glass cylinder fixed horizontally, the object reflected in either of these ways may thus be viewed through the slit or hole on the opposite side. There is yet another way of attaining the end in view. Graduate a rim of the bowl or cover of the common binnacle compass, putting a proper zero mark on the other rim, by turning the cover so as to bring a bar of the roof into the shadow of the opposite bar, the zero mark indicates the angle between the object and the ship's head. This with the azimuth of the object and the usual reading of the card suffices, as above shown, to give the true meridian, and the deviation of the compass from it.

Corrosion of Cast Iron.

It has been often stated that cast iron, when exposed to the action of sea water or to atmospheric influences, under certain conditions becomes "rotten," an expression which is intended to indicate a loss of strength or cohesion without a corresponding alteration of volume or size. This phenomenon is entirely different from common oxidation, or rusting, which latter process shows itself by attacking the surface, and gradually reducing the size of the article, which, so far as it remains intact by this external reduction, does not seem to lose its qualities, so that the reduced strength of a rusted bar is simply proportionate to the reduction of its original section. The state of corrosion which would justify the term "rotten" is a reduction of cohesion without any apparent removal of material, and is not easily recognized externally. The nature of this change has for a long time remained unexplained, until some very interesting experiments established its scientific *rationale*. We believe that this scientific discovery is due to Mr. Crace Calvert, F.R.S., of Manchester, who some years back carried out a series of very interesting experiments on this point. Mr. Calvert immersed cast iron cubes, made of Staffordshire cold blast iron, and cast one centimeter in dimension into acidulated water. Each cube was placed by itself in a corked bottle with eighty cubic centimeters of a very diluted acid. Amongst the acids tried were sulphuric, hydro-chloric, and acetic acid; their action upon the iron was very slow, and it required a long time to show any change whatever. After three months of contact Mr. Calvert found that, although the external appearance of the cubes was not changed in any way, some of the cubes, and particularly that in contact with acetic acid, had become so soft externally that a knife blade could penetrate three or four millimeters deep into the cube. The solutions were then removed and replaced by fresh acid of the same kind in each bottle, this removal being continued every month for two years. After this period changes had been effected in almost all the cubes, only the penetration was more or less complete according to the nature of the acid. Acetic acid had acted most energetically of all; next came hydrochloric and sulphuric acid. Phosphoric acid showed no similar action. The result of the action of the acid was a complete change of the nature of the metal, without any alteration of its bulk or of the appearance of its surface. The cubes of gray cast iron, which originally weighed 15.324 grammes each, weighed only about 3½ grammes at the end of two years, and their specific gravity was reduced from 7.858 to 2.751. The iron had been gradually dissolved or extracted from the mass, and in its place remained a carbon compound of less specific weight, and very small cohesive force, which occupied the same bulk as the original cast iron. The composition of the cast iron and of the carbon compound which remained in its place after two years of contact with acetic acid was found by Mr. Calvert as follows:

	Original Cubes.	Carbonaceous Substance.
Iron	95.413	79.960
Carbon	2.900	11.070
Nitrogen	0.790	2.590
Silicium	0.478	6.070
Phosphorus	0.132	0.059
Sulphur	0.179	0.096
Loss	0.108	0.205

Acids, like hydrochloric, sulphuric, and acetic acid, are to be found in water under a great variety of circumstances. Sea water contains these, or at least the elements from which they can be formed by decomposition of the organic or unorganic matter contained in them; they appear in the air, and are carried by the rain or snow down to the surface, particularly in the vicinity of manufacturing localities. The gradual deterioration of cast iron when exposed to actions of that kind—a change which is all the more dangerous, as it is not immediately apparent to the eye—may therefore be considered as a possibility, and in the presence of acidulated water or sea water may be even called an established fact. It is probable that a coating of the metal or paint, in so far as it is impervious to water, may prevent, or at least lessen this injurious action, but this has not as yet been established by direct experiment. There are many engineering structures relying for their safety upon the strength of cast iron in contact with sea water, and the chances of injury from this action should never be lost sight of during the periodical inspection of such works.—*Engineering.*

Petrified Forests.

The process of isomorphism, the formation of what is usually termed a petrifaction, and some few other similar subtle operations of nature, have never been completely fathomed and satisfactorily accounted for by either the practical man or the theorist. There exists in the vicinity of Cairo, although but little known to European visitors, and still less to the Arabs in general, a petrified forest, which presents features of great attraction to the geologist and antiquary. Owing to the intense heat of the sun the expedition to this curious natural feature of the country is best made at night time. Leaving the city by the Gate of Nasr, and traveling in an easterly direction, the tourist reaches the "Tombs of the Caliphs." These sepulchres are small mosques, furnished with a minaret and cupola, and are designed in the purest style of Arabian architecture, a style especially delighting in those multitudinous vagaries of delineation which have given rise to the term arabesque. Unfortunately these unique relics of bygone splendor are left altogether to the ravages of time, and it is lamentable to predict that in a short time they will disappear forever. After passing them a brief interval reveals to notice here and there fragments of petrified wood, the advance guard of the forest, which, however, is still some distance off. Bearing uniformly to the east, and surmounting and descending numerous sand hills, the promised land is gained at last, and a land more desolate and more barren it would be difficult to conceive. The term "petrified forest" may perhaps seem a misnomer when it is stated that there are neither trees nor leaves. The fragments, to all appearance, are stones, only outwardly resembling wood, and in myriads of pieces are scattered, half buried in the sand, like "the ocean witnesses." One of the most remarkable circumstances is that the most accurate search, the most rigid scrutiny, fails to detect the least vestige of arable land, the smallest oasis, which could have afforded an origin to these mutilated relics of timber. Occasionally a trunk is found riven in two, as if split by the heat. The largest of these specimens measures ten feet in length, and has a diameter of twelve inches. One would naturally expect that the species or description of timber to which these petrifactions belonged would be identical with that met with at present in the country. The reverse is the fact. The oak, the beech, the chestnut, and others, are distinctly recognized, but scarcely a single specimen can be discovered of the palm, the sycamore, or the fig-tree. Not only does the specific gravity of the specimens vary, as is always the case with timber, but the original color is well preserved. All the tints are plainly perceptible, from the light Naples yellow to the deep red, brown, or even black. The perforations produced by the passage of insects through the bark are clearly visible, and a gummy secretion has been found in some of the holes made in this manner. It would be idle to attempt at present to offer an explanation of this curious phenomenon, but it is to be hoped that geologists will ultimately solve the problem.—*The Engineer.*

New Anæsthetic, Bichloride of Methylene.

Methylene is a fluid like chloroform in appearance and odor, but differing in its boiling point and its specific gravity. It boils at 88° Fah., and has a specific gravity of 1.34; chloroform boils at 142°, and has a density of 1·49. This substance has chemical relations also with tetrachloride of carbon, the anæsthetic properties of which are known. Chemically speaking, the bichloride of methylene is constructed from the organic radical, methyl, represented by C H^3, by the withdrawal of one atom of hydrogen, giving methylene C H^2, and the addition of two of chlorine—thus, C H^2 Cl^2. The composition of chloroform is C H Cl^3. It differs from the bichloride of methylene in having one atom of hydrogen less and one atom of chlorine more in its composition. The radical methyl may enter into composition with chlorine, giving rise to the to the chloride of methyl, C H^3 Cl, which was discovered in July to have gentle anæsthetic properties by Dr. Richardson. We have, then, a series of compounds,

C H H H Cl, Chloride of methyl,
C H H Cl Cl, Bichloride of methylene,
C H Cl Cl Cl, Chloroform,
C Cl Cl Cl Cl, Tetrachloride of carbon.

All of these compounds are anæsthetic, Dr. Richardson having discovered the anæsthetic properties of the first of these in July last, and of the second in August. That gentleman has experimented on himself and on animals with these new anæsthetics; and two cases of ovariotomy in the practice of Mr. Spencer Wells have apparently proved satisfactorily the anæsthetic power of the bichloride of methylene, which, as it is intermediate in composition, Dr. Richardson regards as also intermediate in strength between chloride of methylene and chloroform. Dr. Richardson has drawn the following conclusions:—

"In its action the bichloride of methylene is more gentle, but as effective as chloroform; it produces less struggling and less vascular excitement. Its narcotic effects are equally prolonged. It acts very uniformly on the nervous centers. It sometimes produces vomiting. When it is carried so far as to kill, it destroys by equally paralysing the heart and the respiration. It interferes less than other anæsthetics with the muscular irritability."

Dr. Richardson expects that it will prove less fatal than chloroform, which causes death, he estimates, once in fifteen hundred cases.—*Chemist and Druggist.*

ANTIDOTE FOR EXTERNAL POISONING BY CYANIDE OF POTASSIUM.—This substance is extensively used in electroplating and other arts, where its external poisoning effects produce many painful and troublesome ulcers on the hands of the workmen. The foreman of the gilding department of the American Watch Works writes to the Boston *Journal of Chemistry* that experience has taught him the most effectual remedy that can be employed in such cases, which is the proto-sulphate of iron in fine powder, rubbed up with raw linseed oil.

THE *Journal of the Telegraph* is the name of a neat little semi-monthly paper, devoted to Electrical Science. Published by James D. Reid, 145 Broadway.

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72,959.—CHURN.—Henry W. Adams, Milton, Pa.

I claim, 1st, The construction and arrangement of the two dashers, D D, in combination with the churn, B, substantially in the manner and for the purposes described.

2d, The rockers, R R, in combination with the churn, B, when connected and operated substantially in the manner and for the purposes herein set forth.

72,960.—ICE HOUSE FLOOR.—Joseph Barbian, Chicago, Ill.

I claim an ice house floor, composed of the grooved zinc plate, F, strips, C C, and strips, E, connected by metallic bands, D, all constructed and arranged substantially as described.

72,961.—FASTENING FOR SHOES.—John Barbier, Boston, Mass.

I claim the bent arms or plates, C, when constructed and attached as set forth, in combination with the entire strips, B, as herein described, as and for the purpose set forth.

72,962.—WELL.—Samuel W. Barr and Edwin McGuire, Beloit, Wis.

We claim the combination and arrangement of the well tube, soldered filter, and drill point, all substantially as and for the purpose set forth.

72,963.—BOOT AND SHOE HEEL.—George Beaty, Middlebury, Ohio, assignor to W. W. Kitchen, West Union, Iowa.

I claim constructing a metal boot heel hollow, when its upper face is beveled, so as to form a broad bearing for the shoe to rest in, and also having a series of spikes arranged in the center thereof, as herein described, and for the purpose specified.

72,964.—FIRE KINDLING AND FUEL.—Ira Bicknell, Cincinnati, Ohio.

I claim the fuel combination, using for that purpose the aforesaid compound of rosin or pitch, fine coal, sawdust, and coal oil, or any other substantially the same, and which will produce the same effect.

72,965. — BAGGAGE CHECK. — Virgil W. Blanchard, Bridport, Vt.

I claim, 1st, The circular plate, A, with the names of the stations of any particular railroad stamped upon its surface, near its periphery, with notches or recesses, cut in the periphery of a circular opening in the central portion of said plate, said notches or recesses corresponding with the names, figures, letters, or other symbols stamped upon the surface of the plate, near its periphery, in combination with the bolt or dog, D, for the purpose of fixing the pointer, B, at any particular name, station, or symbol, on the outside of the plate.

2d, Also a plate, bearing the number of the check, attached to the plate bearing the pointer, the circular plate having the names of the stations of any particular road stamped upon its surface, near its periphery, revolving between them, when not locked by the bolt or dog, D, for the purpose specified.

3d, Also, a bolt or dog, playing freely in a recess between the plate bearing the pointer and the one bearing the number of the check, in combination with the notches or recesses cut in the periphery of the circular opening in the central part of the circular plate, for the purpose of fixing the pointer at any particular name, number, or symbol.

4th, Also, a bolt or dog in combination with a slit or opening cut in the plate bearing the pointer, and the one bearing the number of the check, so arranged, with a strap connecting the check to the baggage or freight, that when the strap is withdrawn from the said slit or opening, the weight of bolt or dog will cause it to fall into said opening or slit, relieving the circular plate, so that the pointer may be turned to any particular name, station, or symbol, when the pointer may be locked in its place, by passing the strap through the opening or slit, and attaching it to a piece of baggage or freight in the usual way.

72,966.—MODE OF REMOVING BURRS AND OTHER VEGETABLE MATTER FROM WOOL.—John W. Boynton, East Hartford, Conn., and John A. McGaw, Newark, N. J.

We claim the employment of chemical vapors in the process of destroying burrs and other foreign vegetable substances in wool, substantially as described.

Also, the employment of steam as a joint agent in diffusing the vapor and heating the apartment to produce the result described.

Also, the process of destroying burrs or other foreign vegetable substances in wool, substantially as set forth.

72,967.—HARNESS FOR LOOM.—Darius C. Brown, Lowell, Mass.

I claim hanging the heddles in their frame at one end to a common bar, but at their opposite ends to two or more bars, substantially as and for the purpose described.

72,968.—MODE OF FASTENING ARTIFICIAL TEETH.—T. Yardley Brown, Reading, Pa.

I claim the attachment of artificial teeth to swaged plates by means of a fusible metal or alloy, as herein described.

72,969.—BILLIARD CUE RACK.—Emanuel Brunswick, Chicago, Ill.

I claim the revolving billiard cue rack, constructed and operating substantially as and in the manner herein described and specified.

72,970.—TABLE LEAF SUPPORT.—Daniel Bull, Amboy, Ill.

I claim, 1st, The combination of a link, A, a recessed bar, D, provided with a spur, f, and a movable stop bar, E, arranged and operating substantially as and for the purposes herein set forth.

2d, Also, the combination of the bar, D, or its equivalent, provided with the spur, f, and the movable bar, E, provided with the prong or fork, g g, arranged in the manner and for the purposes described.

3d, Also, the recess, l, in the bar, D, and the projection, m, on the bar, E, arranged substantially as specified, to prevent the longitudinal displacement of the bar, E, as described and shown.

4th, Also, providing the bar, D, with slots, d d, to admit of the adjustment thereof, as and for the purposes specified.

72,971. — SEED-PLANTING MACHINE. — Henry Bundel and James Williams, Dayton, Ohio.

We claim, in combination with the lifting bar, D, for raising, supporting, or lowering the shoes, the arms or brackets, c b, for forming its hinged connection with the main frame, substantially as and for the purposes herein described and represented.

72,972.— MECHANICAL MOVEMENT.— H. C. Burk, Mineral Point, Ohio.

I claim the combination of the main wheel, A, spur-wheel, B, with its pitman, E, and pinion-wheel, C, all arranged to operate substantially as and for the purpose set forth.

72,973.—MATCH SAFE.—P. D. M. Carmichael, Le Roy, N. Y.

I claim the propelling arm, B, constructed substantially as described, in combination with the actuating lever, e, spring, f, and mouth, k, arranged and operating substantially as and for the purpose set forth.

Also, in combination therewith, the dog, g, and spring, arranged and operating substantially in the manner and for the purpose specified.

72,974.—SEWING-MACHINE.—Wm. Chicken, Chelsea, Mass.

I claim, in combination with a disk, provided with gear teeth, and having a cam for working in connection with a stationary plate cam, as described, a pinion, which meshes into the teeth of the disk, and on which pinion a friction clamp or gripe operates to impart intermittent rotative movements to said disk, for the purpose of giving movement to a stock or cloth clamp, substantially as described.

72,975.—CULTIVATOR.—Daniel Churchill, Ionia, Ill.

I claim, 1st, The plates, I and F, when constructed and arranged to operate substantially as described.

2d, The plates, J, provided with the studs, c, for securing and holding the beams to the main frame, and having also the slots for adjusting them, as set forth.

3d, The combination of the bent rods, T, and cross-rod, H, pivoted to the main frame, and arranged to operate as described.

72,976.—FARM GATE.—William D. Clark, Ottawa, Ill.

I claim the peculiar and particular arrangement of the guides and rollers described, when attached to the gate, operating and constructed as set forth.

72,977.—COMPOSITION FOR ROOFING.—Allen Cody, James Bartlett, and Henry M. Jones, Ukiah city, Cal.

We claim a compound cement for roofing purposes, prepared and applied substantially in the manner and for the purposes set forth.

72,978.—EYE GLASS.—E. Merritt Cole, Southbridge, Mass.

I claim the arrangement and application of the tenon and mortise with the lips, and with respect to the joint screw or pin of the spectacle or eye-glass frame, substantially as specified.

72,979.— ANIMAL TRAP.— William Cover, Jenner's Cross-Roads, Pa.

I claim a trap, consisting of a box, A, having one part closed by a cover, and a partition, B, having an opening through it, and with the revolving wire cylinder, C, mounted in the open portion of the box, A, all constructed and arranged for operation, as shown and described.

72,980.—METHOD OF ROASTING METALLIC ORES.—Francis W. Crosby, Toledo, Iowa.

I claim the method, substantially as herein described, of obtaining a pernous disposition of pulverized ores within the reducing chamber of a furnace, for the purpose set forth.

72,981.—COMBINED SULKY PLOW AND CULTIVATOR.—William G. Crossley, Shellsburg, Wis.

I claim, 1st, The arrangement and combination of the beam, C, rod, i spring catch, y, and lever, h, for regulating the position of plow, E, substantially as and for the purpose set forth.

2d, The combination of rod, S, having a lever, S', with arms, Q Q, elbows, T T, loops, P P, and shanks, M L, arranged to raise and lower shovels, f f f f, and hold them in position as described, in conjunction with bars, O O, as set forth.

3d, The loops, K H, in combination with a movable brace, G, having the plate, J, arranged so as to fit either loop, as and for the purpose set forth.

72,982.— CARTRIDGES FOR SMALL-ARMS.— Thomas Cullen, San Francisco, Cal.

I claim the method and arrangement of securing the metallic base or cap, a, to the paper tube, d, which holds the charge, by means of the nipple, c, screwing into the interior washer, b, as substantially herein set forth and described.

72,983.—SAW.—James Davis, Buffalo, N. Y.

I claim, 1st, Making the saw teeth above and below the center line, 1 2, with their cutting edges toward said line, and the rake or set above the reverse of that below the center line, in the manner and for the purpose described.

2d, The projection, D, at the point of the saw tooth, for the purpose set forth.

72,984.—CAR BRAKE.—Fred. Dengler, North Vernon, Ind.

I claim, 1st, The lever, B, and roller, C, acting on the curved lever, A, all combined and operating substantially as described.

2d, Also, the wheel, H', fixed upon the axle, the wheel, u, and cogged wheel, v, and pawl, and the intermediate roller, w, all constructed and operating in combination with each other, as described.

72,985.—CAR BRAKE.—David Dick, and O. W. Preston, Jr., Corning, N. Y.

We claim, 1st, The dog, D, as constructed, in combination with spring, i, operating conjointly substantially as set forth.

2d, In combination with dog, D, and spring, i, we claim kicker, h, and spur wheel, g', substantially as described.

3d, The engineer's connecting rod, W, when in combination with the brake apparatus, substantially in the manner specified.

4th, The pitch chain wheels, f g, and chain loop, M, in combination with rocking shaft, b, chain bar, B', and braking devices, substantially as described.

5th, The rocking shaft, b, worm wheel, d, slide, e, connecting rod, u, chain bars, B' E, and engineer's connecting rod, W, all combined substantially in the manner and for the purpose set forth.

72,986.—STOP COCK.—Justus Doering (assignor to himself, A. F. Shelly, and Charles Dixey), Philadelphia, Pa.

I claim the combination of the case and conical valve of a cock, and a conical stationary sleeve, fitting the case, and in which the valve turns, and which is so constructed and connected to the valve that it may be withdrawn with the latter from the case without the necessity of detaching any nuts or other fastenings, all substantially as described.

72,987.—LET-OFF MECHANISM FOR LOOM.—George Draper, Milford, Mass.

I claim the said combination of devices, substantially as above described, for operating the said ratchet, the warp guide and beam, in manner as specified.

Also, their combination with the warp beam and its gearing, and ratchet, and with the warp guide, and the lay, the whole being substantially as explained.

72,988.—TRUNK.—Jonathan Smith Eaton, Roxbury, Mass.

I claim the combination, with the frame of a trunk, of the strips or pieces a a, substantially as and for the purpose set forth.

72,989.—BREWING.—William H. Elliot, New York city.

I claim the process herein described of brewing malt liquors, viz., condensing the vapor of boiling wort, returning it to the wort in a liquid state, and fermenting the two liquids together, substantially as herein set forth.

2d, Cooling the wort and condensed vapor separately, and afterwards mixing the two liquids together, before fermentation, substantially as herein specified.

3d, Employing a tank or reservoir, l, with its cooling device, in combination with tank, b, with its usual heating device, substantially as shown and described.

72,990.—HARVESTER RAKE.—Vanderlyn H. Felt, Rochester, N. Y.

I claim, in combination with the reciprocating rake, F, provided with projections, q r, the arrangement of the connecting and operating parts, consisting of the loose pulley, H, provided with the reacting spring, l, and operated by lever, K, the endless chain, G, the hinged bar, o, and the stop and projection, m' m, the whole operating in the manner and for the purposes set forth.

72,991.— EXPANDING PULLEY FOR BRAIDING MACHINE.— Jesse Fewkes, Newton, Mass., assignor to Silver Lake Manufacturing Company.

I claim the combination of the rods, b, pivoted to the pulley, A, with the plate, C, constructed as described, and the screw, D, for governing positively the position of said rods, substantially as described, and for the purpose set forth.

72,992. — INDIA-RUBBER DOOR SPRING. — B. G. Fitzhugh, Sykesville, assignor to himself and William G. Maxwell, Baltimore, Md.

I claim an India-rubber door spring, that is vulcanized in a curved or circular form, and applied to a door in a straighter form than that in which it was vulcanized, substantially as and for the purpose herein described and represented.

72,993.—HOLDER FOR GUM SCRUBBER.—Leonard Fleckenenstine, Manor Township, Pa.

I claim the arrangement of the two corrugated or fluted plates, P R, for the purpose of folding the scrubbing edges of India-rubber, together with the use of a socket and screw bolts, substantially in the manner shown and specified.

72,994.—COMPOSITION OF MATTER FOR THE MANUFACTURE OF EMERY CLOTH, POLISHING WHEELS, ETC.—Lewis Francis (assignor to himself and Cyrus H. Loutrell), New York city.

I claim a composition of matter for various purposes, when the same shall be made substantially as herein described.

72,995 —SCISSORS SHARPENER.—L. M. Gilbert, Warren, Mass.

I claim a scissors sharpener consisting of the bevelled file, A, combined and arranged with the circular guide piece, C, the parts being constructed and the whole arranged substantially as and for the purpose specified.

72,996.—MEDICINE FOR THE CURE OF HOG CHOLERA.—Geo. W. Gish and Wm. M. Ferguson, Daviess County, Ky.

We claim the medicine made by mixing, or by using at the same time, the ingredients described, for the purposes set forth.

72,997.—MANUFACTURE OF CLAY PIPES.—Geo. D. Goodrich, Joliet, Ill.

I claim, 1st, The improved method of fastening the trough carriage in, and disengaging the same from its rigid and described position on the frame on which its rests, substantially as herein described and specified, or other equivalent devices.

2d, The movable mouth piece, H, arranged substantially as herein described and specified.

3d, The combination, in a machine for the manufacture of clay pipes, of the trough for receiving the pipe, and the apparatus for lubricating the pipe as it issues from the mouth of the machine, substantially as described.

4th, Each of three devices to be used in combination with the clay pipe making machines, running the pipe continuously, and using the metallic or metallic lined troughs.

72,998.—HAT BLOCKING MACHINE.—Wm. C. Griswold, New York city.

The ring, A, to which the clamps are hinged when elastically seated, substantially as and for the purpose specified.

72,999.—HARVESTER.—Samuel B. Haines, Lewistown, Pa.

I claim, 1st, The leading wheel, A, attached to the shoe, G, as herein described and represented, and performing the double function of supporting the inner end of the finger beam and operating either the rake or reel, or both, as and for the purpose set forth.

2d, The grain wheel, M, in combination with the divider, L, provided with the flanges, d d', the latter being notched at d', and adjustable bearing, O, all constructed and arranged substantially as described, so as to admit of the wheel, M, and secure the protection of the latter by the divider, as explained.

73,000.—SAWING MACHINE.—I. R. Harman (assignor to himself and Thomas J. Meginnis), Whitestown, Ind.

I claim the combination of the movable center, 15, with slides, 7 and 7, 4 and 6, and eccentric cam, 5, and spring, 13, all constructed and operating substantially as set forth.

73,001.—APPARATUS FOR CLARIFYING SACCHARINE JUICES. L. P. Harris, Crestline, Ohio.

I claim, 1st, The adjustable float, and its combination with the siphon.

2d, The combination of the adjustable float and siphon with the tube, c, and pipes, d and e, substantially as described.

3d, A cane juice clarifier, constructed and operated substantially as described.

4th, The combination of a cane juice clarifier, when constructed and operated substantially as described, with heating and evaporating pans, for the purposes set forth.

73,002.— PLOW AND HARROW COMBINED.— James Harsha, Circleville, Ohio.

I claim the bar or chain, A, lever, B b, and chain, D, arranged and applied substantially as described, for the purpose of combining an ordinary plow and harrow.

73,003.—ELEVATED RAILROAD.—Charles T. Harvey, Tarrytown, N. Y.

I claim, 1st, The arrangement and combination, with the column, a, of a false base, t, made in sections, and secured around the column at the surface of the ground, substantially as described.

2d, In a supporting column, the supplementary arc-shaped pieces, V, in combination with the branching arms of the column, a, with or without the triangular filling pieces, u, substantially as described.

3d, The base plate, n, in combination with the ears, m, arranged to fit the triangular interspaces of the column as ribs or flanges, 2, substantially as described.

4th, The arrangement and combination, in one piece, of the plate, k, the cap plate, i, and the connecting cylinder, j, substantially as described.

5th, The construction of the cap plate, i, with its friction rollers, l, substantially as described.

6th, The arrangement and combination, in the cable guide, e, of the wooden foundation, 4, and wooden side beams, 5, with the metallic bottom plate, f, and top right angled bars, g g, substantially as shown.

7th, The return cable guide, e', made substantially as described, by inverting the cable guide, e, and combining therewith the inverted cap, b, substantially as described.

8th, The arrangement and combination of the upper rail, b, the I-shaped rails or beams, c c, and the wooden filling, d, substantially as above described.

9th, Arrangement of the main rail, b, upon the top of an under rail or beam, with a layer or cushion of wood interposed between them, substantially as described.

10th, The column, a, composed of ribbed segments, p, in combination with the flanged bars, r, which serve to unite the segments together, substantially as described.

73,004.—VEGETABLE CUTTER.—T. J. Hatfield, Warsaw, Ind.

I claim the combination of the reciprocating bed, B, adjustable knives, 1 2 3, plates, B' B', arranged with set screws, X X, box, D, follower, E, and spring lever, o, substantially as and for the purpose herein set forth.

73,005.—FLOWER STAND.—C. J. Hauck, Williamsburg, N. Y.

I claim a flower stand, composed of one or more sections, each made of a platform, a, with a ring, b, and one or more standards, c, supporting a guide ring, d, all as shown and described.

73,006.—TOY.—John E. Hawkins, Lansingburgh, N. Y.

I claim the combination and arrangement of the ball driver or pocket, C, and its spindle, B, with the stock or handle, A, and cup, D, in manner substantially and for the purpose as herein described.

73,007.—FIRE ESCAPE.—Edward Hawthorne, Mountain View, Cal.

I claim the apparatus constructed, arranged, and operated substantially as and for the purpose described.

73,008.—INVALID BEDSTEAD.—Wm. Heath, Bath, Me.

I claim the arrangement and application of the windlass, G, and its cord, H, and the gear, g, and belt, h, thereof, with the lock frame, B, and the main frame, A, of the bedstead, substantially as described.

Also, the combination of the movable bracket, N, and its supporting rod and weight, O, with the seat frame, C, and its arm, R, as set forth.

Also, the seat elevating mechanism, and its arrangement with the main frame and the seat frame, as specified, such seat elevating mechanism, consisting of the shaft, H', its screw or screws, k k, and one or more wedges, I I, and inclined planes, K K, to operate together, as explained.

Also, the combination of the toggles, P Q, with the movable bracket, N, its supporting weight, O, and arm, R, as hereinbefore described.

73,009.—HAY FORK.—John G. Hitchcock, New York city.

I claim, 1st, Holding the tines against end pull by means of the projections or shoulders, b, arranged to lock against the ferrule or cap, C, while the latter is fixed on the handle by the screw, D, or its equivalent, all substantially as herein set forth,

2d, The within described construction of the fork tines, B, with a shoulder, b, at the commencement of the root of the tine, adapted to apply against a solid end of the cap, C, substantially as and for the purpose herein set forth.

73,010.—BOOTS.—James Holland, Conshohocken, Pa

I claim a metal ring or bent wire, d, applied to the upper edge of the boot leg, within the folds of the strips, A and A', as set forth, for the purpose specified.

73,011.—FIELD FENCE.—D. S. Humphrey, East Townsend, O.

I claim the combination of two or more wires, B, with the posts, A, and slats or pickets, d, when secured thereto by means of the hook spikes, C, as specified.

73,012.—LANTERN.—John H. Irwin, Chicago, Ill.

I claim, in combination with the burner of a lamp, and a globe or protector thereof, one or more tubes or passages, D, or their equivalent, arranged to operate substantially as specified and described.

73,013.—ALARM LOCK FOR DOORS.—Anthony Iske, Lancaster, Pa.

I claim the combination and arrangement of one or two hooked bolts, C, lever, D, sleeve, E, with the arm, B, on the vibrating plate, with or without its knob, b, when applied to a lock for the purpose of connecting the same with the bell or alarm, in the manner specified.

73,014.—FASTENING OF JAR COVER.—J. F. Johnson, New York city.

I claim the use of two or more inclines in recess on the neck of the vessel, in combination with a metal cap or stopper, with corresponding inclines, substantially as described.

73,015.—WATER HEATER FOR FIRE ENGINES.—Peter M. Kafer and Joseph M. De Lacy, Trenton, N. J.

We claim the arrangement of the checks, A A and E, elastic pipes, F, F, condensing coil, D, and with cocks B B and D D, levers, c d, pin, e, compensating levers, b b, wrenches, a a, constructed substantially as set forth.

73,016.—FARM GATE.—Israel L. Landis, Lancaster, Pa.

I claim, 1st, The upright lever, K, its spring, N, clip, M, and latch, P, when arranged, combined and operated by the rope, S, and pulleys, T, as herein described, and for the purposes set forth.

2d, The construction and combination of the bent hinge, C, with its inside block, F, as herein described, and for the purpose set forth.

3d, The diagonal rail, X, with its clip, Z, when combined and operated with the upper rail, G, of the gate, as herein described, and for the purpose set forth.

73,017.—BREAD CUTTER.—John Madden and I. G. Haserot, Cleveland, Ohio.

We claim, 1st, Operating the hinged or jointed table, F, by means of the cam, H, substantially as and for the purpose set forth.

2d, The adjustable table, F, and cam, H, in combination with the knife, substantially as and for the purpose set forth.

3d, The arrangement of the knife in two sections, D D, and jointing the same together, as seen at J, in combination with a table and slide, for the purpose set forth.

73,018.—CONFECTION OR CAKE.—Wm. Manning, Chelmsford, Mass.

I claim a new and improved combination cake, as herein described, using for that purpose the aforesaid ingredients, or composition of matter, or any other substantially the same, and which will produce the intended result.

73,019.—LINE REEL.—Lyman Martin, Indianapolis, Ind.

I claim the combination of the frame, A, drum, B, crank, C, the plate, D, and pin, G, for the purpose of a line reel, all arranged and operating as set forth and described.

73,020.— SEEDER AND CULTIVATOR.— Henry S. Matteson, Stockton, Cal.

I claim 1st, The beams, C. B, in combination with beams, D, and cross beams, I, with draw bar, L.

2d, The chest, A, wooden shaft, h, and iron slide, i, in combination with crooked pin, k, handle, O, crank, b, connecting rod, c, when used and arranged for the purpose herein specified.

73,021.—APPARATUS FOR COLLECTING PRECIOUS METAL.— James T. McDougall, San Francisco, Cal.

I claim, 1st, A sluice containing obstructing standards, so placed as to convert the current into eddies, substantially as herein described.

2d, The iron standards, B C, together with the removable copper tubes, D, or an equivalent device, constructed and arranged substantially as above specified.

3d, The plugs, a a, for raising and lowering the tubes, substantially as described.

4th, The copper plates, b b, when employed and attached to the sides of the sluice, as and for the purpose herein described.

73,022.—CORN PLANTER AND PLOW COMBINED.— Patrick McIsaac, Waterloo, Iowa.

I claim the herein described arrangement of the several parts constituting the corn planter, and the mode herein described of attaching the same to a common plow, as specified.

73,023.—CHURN.—Gabriel McWilliams, Fostoria, Ohio.

I claim the tube, B, piston, F, as arranged in combination with the case, A, and operated in the manner and for the purpose set forth.

73,024.—HARROW.—John Mercier (assignor to Israel Kinney), Detroit, Mich.

I claim, 1st, The blocks or balls, A A, etc., with holes cast or bored, and the rods, B B, etc., when constructed substantially as and for the purpose described.

2d, The combination of the above described blocks or balls, A A, etc., and B B, etc., in conjunction with harrows or cultivators, when constructed substantially as described, and for the purpose set forth.

3d, The disk, G, the draught bar, H, and the pin, I, when attached to cultivators or harrows, in the manner and for the purpose described.

73,025.—SLEIGH RUNNER.—John G. Meiler, Plymouth, Mich.

I claim, 1st, The construction of metal runners, of the shape set forth, provided with clips, B, and provided with means of connection, substantially as described, and for the purpose set forth.

2d, The attachment, constructed from iron straps, H and I, provided with the adjusting bolt, K, and the slot, J, operating substantially as and for the purpose described.

3d, The combination of the above described runners and attachments, when constructed substantially in the manner described.

73,026.—COTTON BALE TIE.—Carson Mudge, New Orleans, La.

I claim the making of the two additional openings or holes, A, in cotton ties, designed for use in connection with hoop irons, so that the same may be used with equal ease for fastening together the ends of wire rope or wire, as herein described.

73,027.—LATHE.—L. F. Munger, Rochester, N. Y.

I claim, in combination with the lathe centers, placed vertically, or nearly so, over the front of the lathe, the ways, a b, on said front of the lathe, for the slide rest to move on, for the purpose of adapting the parts to the different operations, as herein described and represented.

Also, the combination of the centering rod with the mandrel and its adjustable bearings, substantially as described.

Also, in combination with a planing or chasing tool, that receives motion from the face plate or mandrel of the lathe, a slide rest or holder, that has a vertical, horizontal and swiveling motion with regard to said tool, as and for the purpose substantially as described.

73,028.—VISE CLAMP.—H. O. Nauen, New York city.

I claim a vise clamp, composed of two jaws, A, hinged together by means of shanks, a, and a pivot or pivots, b, and provided with lips, d, on their backs, d, removable lining, e, on their working faces, and a spring, c, which opens the jaws, substantially as herein set forth.

73,029.—VELOCIPEDE.—Martin Newman, Unadilla, N. Y.

I claim the device for propelling velocipedes, constructed substantially as herein shown and described.

73,030.—PULLEY BLOCK.—I. W. Norcross, Boston, Mass.

I claim, 1st, In pulley blocks, making the several cheeks by casting them independently and separate from the other parts, substantially as described.

2d, The cast studs, E, interposed between the cheeks, and held thereto by rivets or other suitable fastenings, substantially as described.

3d, Dividing the stud, E, and combining the same with the eye, D, substantially as described.

4th, The skeleton partition or cheek, H, substantially as described.

5th, Arranging anti-friction rollers, I, beneath the axles of the pulley, substantially as above described, in combination with a pulley block of any form or construction.

6th, The hollow partition, H, made substantially as described, for the purpose of containing an anti-friction roller, one or more, to support the axles of the pulleys, and to form a recess for the shank of the eye.

73,031.—SAW MILL.—C. D. Olmstead, Williamsport, Pa.

I claim, 1st, The stirrup, with its fast and loose sides, holding in one side the section of a ball, and provided with set screws for adjusting purposes, all

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arranged and constructed as shown and described, and for the purpose indicated.

2d, In connection with the stirrup, as shown, the construction and arrangement of the various parts which constitute my muley block, as described and for the uses indicated.

73,032.—STEAM TRAP.—Chas. E. Palmer, Manchester, N. H.

I claim the movable valve seat, C, constructed with a partitioned coupling, A B, substantially as set forth.

73,033.—RAIL SET.—George Patterson, Augusta, Mich.

I claim the within described device, C D E, adapted for bending or straightening railroad rails, substantially as specified.

73,034.—COTTON BALE TIE.—Joshua L. Phillips, Washington County, Miss.

I claim the device herein described, consisting of the central bar, A, when provided with the wings, B B', in which, at the points, a a', are grooves to receive the band, a longitudinal opening for the ends of the band, and holes, d d', as and for the purpose herein set forth.

73,035.—ANCHOR.—D. C. Pierce, Clayton, N. Y.

I claim the fenders or rods, C C D, constructed as shown, attached to the flukes and stock of the anchor substantially in the manner as and for the purpose set forth.

73,036.—ANCHOR.—D. C. Pierce, Clayton, N. Y.

I claim the shackle, E, in combination with the bars, C C, and the pivoted fluke, A, all arranged substantially as and for the purpose specified.

73,037.—PICKER MOTION FOR LOOMS.—Joseph Pilkington, Frankford, Pa.

I claim the combination of the weight, 2, shaft, O, arm, g, and staff, d, all constructed and arranged as and for the purpose described.

73,038.—PUMP VALVE.—Wm. H. Pollard (assignor to Downs & Co.'s Manufacturing Company), Seneca Falls, N. Y.

I claim the combination of the concave disk, g, of the valve, with the elevated seat, a, arranged as described, and operating in the manner and for the purpose specified.

73,039.—LOCK COUPLING FOR GAS FIXTURES.—Thomas L. Reed, Providence, R. I.

I claim the coupling constructed substantially as described, with a male and female sleeve, and an annuiar packing cavity, and a helical groove, and a peg or stud, in combination, all as and for the purpose set forth.

Also the packing ring composed of india-rubber and leather united together, substantially as described for the purpose specified.

73,040.—GAS SOCKET.—Thos. L. Reed, Providence, R. I.

I claim the shell of the socket constructed with a cylindrical cavity, and a shoulder, e, and a lip or ledge, i, as described, and in combination with the packing n, constructed substantially as and for the purpose set forth.

73,041.—APPARATUS FOR SEPARATING GOLD FROM ORES.—Thomas Rhoads, Ottawa, Ill.

I claim the inside double helix, C, the helix, B, inside kettle, A, the feed pipe, F, and the heating flue, H, when in combination with each other, constructed substantially as and for the purpose described in the foregoing specification.

73,042.—DRIVING BRIDLE.—Archibald Rice and Lewis Leach, Fresno, Cal.

We claim the combination and arrangement of the straps, a a, with loops or pulleys, c c and d d, with the reins, A, hitched to the post hook, and running through the loops or pulleys, c c, and to the hames or saddle, substantially as described.

73,043.—DEVICE FOR SECURING STOPPERS TO BOTTLES.—Wm. H. Richards, Auburndale, Mass.

I claim a device for securing corks or stoppers to bottles, demijons, etc., substantially as described.

73,044.—MACHINE FOR POUNCING HATS.—John C. Richardson, Newark, N. J., assignor to himself and James H. Prentice, Brooklyn, N. Y.

I claim, 1st, Mounting the partially revolving frames, B and C, and their connections on the centers, b and c, arranged out of line with the shafts, D and M, and arranged to operate relatively to each other substantially as and for the purposes herein set forth.

2d, Also, in pouncing machines, the sand paper, W, or its equivalent, the beveled parts, P and R, and the buttons, V, and grooves, r, or their equivalents, combined and arranged for joint operation as a pouncing wheel, substantially as and for the purposes herein set forth.

73,045.—CHECK FOR PICKER STAFF.—Elisha Robbins, Worcester, Mass.

I claim the arrangement and application of the adjustable spring brake with the picker staff and shuttle box, as described.

Also the combination and arrangement of the adjustable spring brake and the arch spring with the shuttle box, the picker, and the sword of the lay the whole being substantially as specified.

73,046.—STUMP EXTRACTOR.—John B. Robertson, New Orleans, La.

I claim the truncated pyramidal frame structure, B C, when the same is supported at its front end by the axle of the wheels, A, and at its rear end by the pivoted adjustable standards, E, in combination with the rod, F, screw, collar, or nut, N, metallic plate, M, circular collar, b, and pivoted standards, b, when these several parts are constructed and arranged for conjoint operation, substantially as herein described, for the purpose set forth.

73,047.—HOOK FOR WHIFFLETREES.—D. D. Robinson, Niles, Mich.

I claim the hook, C, pivoted in the groove at the outer end of the socket, A, connected closely to the projection, B, forming a perfect loop, and held in place by the spring, a, when all are constructed and arranged as herein set forth.

73,048.—MODE OF LASTING BOOTS AND SHOES.—Ichabod R. Rogers (assignor to Geo. E. Bartlett), Lynn, Mass.

I claim an inner sole, A, of any suitable material, provided with a row of stitches, a, by which the upper leather is united to it by stitches, substantially as and for the purpose set forth.

73,049.—GATE.—Wm. H. Rogers, Harlen, Ill.

I claim, 1st, The combination of the gate, a a', with the cord, n, and the roller, u, sheaves, v w, and handle, m, or an equivalent, arranged for the purpose of opening the gate, substantially as described.

2d, The combination of said gate with the cord, e, and the sheaves, b i, and handle, l, or an equivalent, for closing the gate substantially as described.

73,050.—HORSESHOE CUSHION.—G. E. Rust, Boston, Mass.

I claim the double pad or cushion composed of leather and felt or other fibrous cloth, and interposed between the hoof of the horse and the shoe, substantially as herein described.

73,051.—TRACTION ENGINE.—Theodore Scheffler and Henry Morrison, Paterson, N. J.

We claim, 1st, in traction engines for common roads, supporting each wheel on an independent short axle, running in suitable bearings, situated on each side and close to the wheel, in the manner and for the purpose described.

2d, The arrangement of the loose clutch, J, and the internal and external clutches, K and L, in combination with the levers, a and b, or their equivalent, operated by the steam cylinder, M, the whole being arranged and combined in the manner and for the purpose substantially as set forth.

3d, Connecting the driving wheels, H, with the driving shaft, F, through chains, or their equivalents, passing over clutches, arranged and operating substantially as specified.

4th, Driving the forward wheels, P P, by a separate and independent cylinder or cylinders attached to the movable truck, Q, and turning with said truck and wheels.

5th, The center piece, R, fast to the truck, Q, with suitable passages for the steam and exhaust through said center piece, in combination with the socket S and guide frame, T, supporting the smoke box, C, or end of the boiler, the whole being constructed and arranged in the manner and for the purpose described.

6th, Operating the ropes or chains that turn the forward truck and wheels of the engine, to guide or direct its movements by means of hydraulic cylinders operated by a force or steam pump, substantially in the manner and for the purpose set forth and described.

73,052.—BED BOTTOM.—Adolph Schlingman, Alexandria, O.

I claim, 1st, A bed bottom consisting of the cord, F, and transverse perforated slats, G1 G2 G3 G4, with or without the longitudinal stiffening slats, H, the cord being rove forth and back through said slats, and held at the ends by pins, substantially as described and represented.

2d, The combination with the cord, F, and transverse, G1 G2 G3 G4, of an adjusting or tightening rail, E or K, applied and operating substantially as described and represented.

73,053.—ROCK DRILLING MACHINE.—Carl Schumann, Freiberg, Saxony, assignor to Edward H. Jackson, Boston, Mass.

I claim, 1st, Imparting a forward and rotating movement simultaneously to the valve rod of a rock drill, by means of the levers, e' e', and their connections, substantially as described.

2d, The rotating device consisting of the levers, e' e', operated by means of the guide, b1, on the piston rod, E', the link, f, guide rod, f', pawl, o, pivoted on the guide rod, f', pawl, o2, pivoted on the guide piece, n, and the guide pieces, m n, and ratchet wheel, H, substantially as described.

3d, The device for operating the valve rod, consisting of the levers, e' e', operated as described, the forked lever, h, to othed wheels. k k, screw rod, j, bar, i, and bar, l, provided with shoulders, l, substantially as described.

4th, The device for rotating the piston rod and rock drill, consisting of the levers, e' e', operated as described, lever, g, slotted guide rod, g', pawl, p, pivoted to the guide piece, m, guide pieces, m and n, shoulder, d, and the piston rod, E', and slotted ratchet wheel, c', substantially as described.

5th, The combination of the pieces, I I', with the morticed shoulders, J, cylinder, K, with tongue, s, clamp, L, and ratchet wheel, H, operated substantially as set forth.

6th, The arms, e e, extending from the back plate, G', of the valve chest, G, forming the bearing of the main shaft of the device, substantially as described.

73,054.—DEFECATING CANE JUICE.—A. B. Sharp, Paincourtville, La.

I claim the supplemental or additional revolving cylindrical water cistern, B, when constructed and operating in connection with Patterson's cylinder A, or any other cylinder substantially the same, and specially employed for purifying the fumes of sulphur to be subsequently used in the defecation of cane juice, as set forth.

73,055.—JOURNALS OF AXLES OR SHAFTS.—Cal in D. Smith, Baldwinville, Mass.

I claim the arrangement of the inclined passage, c, and the grooves, a and b, together and with the journal, as specified.

73,056.—MACHINE FOR MASHING AND BOILING WORT FOR FOR BEER.—John Stark and Michael Stark, Buffalo, N. Y.

We claim the combination of a beer mashing and boiling apparatus, in the manner and for the purpose set forth, or any other principally the same.

73,057.—MANUFACTURE OF ILLUMINATING GAS.—Levi Stevens, Washington, D. C.

I claim, 1st, The use of a close chamber, for mixing a hydrocarbon and hydro-oxygen, under heat and pressure, which mixture is to be afterwards retorted, to convert it into a fixed gas for illuminating purposes, as described.

2p, Also in combination with the close heating or mixing chamber, an injecting apparatus, worked by a volume of escaping steam to force the hydrocarbon into said chamber against the pressure of steam therein, substantially as described.

73,058.—RAILWAY CHAIR.—Isaiah Tillson, South Abington, Mass.

I claim the arrangement and combination of the jaw arms and their chambers in the chair, with the jaws and the rails arranged within the chair, as set forth.

Also the combination of the covering plates with the jaws, their arms, and the chambers for receiving such arms, as set forth, such covering plates serving to prevent the jaws and their arms from being thrown out of the chair by vertical movements or vibrations of the rails.

Also in combination with the chair, movable jaws, to act against or grasp opposite sides of the rail or rails, and be pressed against such by a weight or wheel while resting on or passing along on such rail or rails, or either of them, as set forth.

73,059.—WINDLASS.—Lafayette L. Treman, Ithaca, N. Y.

I claim, 1st, The enlarged ends of the levers extending and bifurcating over the ratchet wheels, E, so as to embrace the said ratchet wheels by a sliding surface, F''', as set forth.

2d, The adjustment of the said levers and ratchets, made as described, on the shaft, C, within the bits, A, for the purposes specified.

3d, The combination and arrangement of the levers, ratchets, and clicks, constituting the working parts of the windlass, within or inside of the bits, for the purpose of giving free scope to the chain, cable, or rope on the heads, and avoiding their interference with the said moving parts, with the heads on the ends of the shaft, outside of the bits, as set forth.

73,060.—PAINTER'S CANVAS.—Chas. Volkmar, Baltimore, Md.

I claim a canvas or other material prepared for receiving colors or other substances, by means substantially as herein described.

73,061.—HARROW.—John N. Wallis and Theodore Wallis, Fleming, N. Y.

We claim, 1st, The flanged cylinder, C, when used as and for the purpose specified.

2d, The double nut or shellpiece, F, when used in the manner and made to subserve the purpose above set forth.

3d, supporting the teeth of drags or harrows by means of a cylinder, which shall allow the teeth to rotate as and for the purpose specified.

73,062.—MODE OF CLOSING UP BOOT LEGS.—Preston Ware, Newton, and Calvin R. Tilton, Tisbury, Mass.

We claim making a boot leg whose diverging edges are united by a lap seam by machinery, substantially as described.

73,063.—SEWING MACHINE.—Albin Warth, Stapleton, N. Y.

I claim, 1st, Making the needle slide, M, and the guide rod, P, either or both, in the form or tubes, closed below, so as to prevent oil used in lubricating them from falling on the table, substantially as described.

2d, The combination of the guide rods, O and Q, with the holding plate, S, substantially as and for the purpose described.

3d, Making the needle and pressure guide rods, O and Q, either or both, hollow, to allow the escape of air, substantially as described.

4th, The combination of the thread guide, s7, with the presser foot, substantially as described

5th, The hook, 28, formed substantially as and for the purpose described.

6th, The combination of the grooved shuttle with the hook, 28, as and for the purpose set forth.

7th, The disconnected friction pins in the shuttle, arranged substantially as described.

8th, The shuttle, S', constructed as shown and described.

9th, The spring, L, arranged so as to bear upward against the needle slide, substantially as described.

10th, The combination of the eccentric, r7, universal joint, G I, rod, F, and needle lever, C, constructed and operating substantially as and for the purpose described.

11th, The tension device, X y, and the take-up, W, arranged and combined substantially as described.

12 The combination of the reversible slide, r, the nut, n, having arms, p p, and the rock shaft, u, having toes, t t, substantially as described.

13th, The lever, w, provided with two shoulders, 1, 1, in combination with the spring, x, substantially as described.

14th, The adjustable plate, 7, for regulating the length of the stitches, in combination with the jaws, 5, 5, of the feeding apparatus, substantially as described.

15th, The box that holds the feed wheel, composed of the rigid plate, 11, the spring plate, 12, and the elastic rings, 14, 16, substantially as described.

16th, The hollow axis in which the feed wheel turns, in combination with the hollow hub, closed at one end, substantially as shown and described.

73,064.—SEWING MACHINE.—Albin, Warth, Stapleton, N. Y.

I claim, 1st, The arm, D, and brace, H, in combination with each other and with the shaft, C, table, A, and platform, G, substantially as and for the purpose described.

2d, The independent take up K, and cam E, in combination with the double pointed shuttle, S, constructed and operating substantially as and for the purpose set forth

3d, Making the shoulders, h, of the double pointed shuttle, S, radiating from the center of the shuttle race, substantially as and for the purpose described.

4th, The arrangement of the winding attachment, m, in combination with the elastic center, j, substantially as and for the purpose set forth.

5th, The cap, k', in combination with the elastic center, j, and with the shuttle race, constructed and operating substantially as and for the purpose described.

6th, The hooked pin, p', in combination with the pin, p, in the shuttle, substantially as and for the purpose set forth.

7th, The movable center, v, in combination with the adjustable center point, r, constructed and operating substantially as and for the purpose set forth.

8th, The adjustable cap, M, on the main cam, E, combined and operating in connection with the feed bar, L, substantially as and for the purpose set forth.

9th, The recess, w, in the presser foot, in combination with the adjustable spring, x, constructed as described, which keeps the braid up against the shoulder, y, substantially as and for the purpose set forth.

73,065.—SHEEP RACK.—Jacob D. White, Kilbourne, Ohio.

I claim a feeding rack or manger a a a b b c c I I, provided with an inclined hinged lid or cover, d d, and a self-adjusting feed rack, g g g2 J J, which is held in a vertical position by the pieces of leather, h2 h2, affixed to each end of the rack, and so arranged as to press backwardly on the feeding material by its own gravity, without any auxiliary appliances, constructed and arranged substantially as herein shown and described, for the purpose set forth.

73,066.—MEANS OF ATTACHING HANDLES TO DIPPERS.—John B. Wood, Cranston, R. I.

I claim slitting or otherwise removing a portion of the material of the stick or handle which is held in the metal socket piece, when combined with the metal socket, substantially as and for the purpose described.

73,067.—FELLER FOR SEWING MACHINES.—Enoch S. Yentzer and Alfred K. McCain, Ottawa, Ill.

We claim, 1st, The attachment of both the single turner, a, and the gage or guide, b to the presser foot, by the means and in the manner substantially as herein described.

2d, The single turner, a, in combination with an adjustable gage or guide, f, adapted for felling seams, substantially as described.

3d, The attachment of the turner, a, of a feller, to an elastic holding plate, B, substantially as described.

73,068.—LAMP CHIMNEY FASTENING.—John Allen and Chas. E. F. Lewis, Washington, D. C.

We claim, 1st, The circular and grooved holder, divided into segments, operating on hinges, and held by fastenings, as herein described and for the purposes set forth.

Also the use of an elastic or rubber ring, fitted into the groove of the holder, for the purposes set forth.

73,069.—VALVE GEAR.—John F. Allen, New York city.

I claim the arrangement of the governor and link motion with reference to the wrist motion, constructed as described, to produce an automatic control of the induction valves, substantially as specified.

73,070.—FRICTION ROLLER FOR BAND SAWS.—Thomas A. Ballou, Cleveland, Ohio.

I claim the roller, A, consisting of the head, A', and follower piece, D, and pieces of raw hide, C, clamped between the head and follower by means of clamp screws 1, all constructed to operate substantially as described.

73,071.—RAILWAY SWITCH.—Truman G. Beecher, Beaver Dam, N. Y.

I claim, 1st, The rails of a portable switch, constructed with flanges, for attaching them to the track of a railroad, and locking them in position, substantially as set forth.

2d, In combination with such rails, the ties, D, constructed substantially as described.

3d, The ties, D, formed with flanges, arranged substantially as set forth, to form locks to hold the tie on the bed-rail, when in proper position to sustain the temporary track.

4th, So constructing the rails of a temporary switch that the temporary track may be carried over the bed-rail, said portable rails being formed substantially as set forth.

5th, In combination with the tie, D, the brace, D1, so arranged as to act both to support the rail laterally and to form a chair to hold the rail down, substantially as described.

73,072.—KEY COUPLING FOR MUSICAL INSTRUMENTS.—Jonas Berger, Knoxville, Ill.

I claim, 1st, The construction of a key coupling in which the octave is operated without depressing its key, substantially in the manner and for the purpose as herein specified.

2d, The construction of the key board, F, with standards E, and providing the same with grooves and slides, d, in combination with the straps, G, cross pieces f and c, standards, D, valves, C C, and springs, a a, all arranged substantially in the manner and for the purpose as herein specified.

73,073.—APPARATUS FOR CARBURETING AIR.—William W. Beech, Cleveland, Ohio.

I claim the immersed carbureting vessel, Z, with its contained float, D, in combination with the gravitating air holder, M, tank, L, and inverted siphons F I Q R, when arranged and employed substantially as and for the purpose set forth.

73,074.—CANE AND UMBRELLA COMBINED.—Geo. Bockstaller, New York city, assignor to Lewis Schneider and W. W. Mackay.

I claim the combination of the cover, detachable from the stretchers, and from the stick and the sheath, F, arranged to take the place of the cover, and to give to the umbrella the appearance of a walking stick, all as set forth.

73,075.—CANT HOOK.—E. Broad, St. Anthony's Falls, Minn.

I claim the plate, D, with its ears and stops, x x, as shown and described, whereby the hook, C, as constructed, is hinged to the handle, A, and prevented from falling too far back or forward, substantially as herein specified.

73,076.—CONSTRUCTION OF LUMBER WAGONS.—S. D. Carpenter, Madison, Wis.

I claim, 1st, The rocker block and the coupling block attached to the pole, for the purposes and substantially as herein described.

2d, Also, the manner of fastening the stakes to the bolster, for the purposes and substantially as herein described.

3d, Also, the manner of fastening the reach together and operating the same, the cast iron socket, C, the sleeves and wedges, the shank, E, and the wrought iron fillet for strengthening the same, for the purposes and substantially as herein set forth.

73,077.—WATCHKEY PROTECTOR.—A. J. Chase, Boston, Mass.

I claim a vulcanized india-rubber key guard, consisting of the bulb, d, and loop, f, made substantially as and for the purposes herein shown and set forth.

73,078.—COMBINED LATCH AND BOLT.—Pascal P. Child (assignor to S. R. Fox Manufacturing Co.), St. Louis, Mo.

I claim the sliding bolt latch, C, in combination with the keeper and striker, D, the latter being constructed as described, with rebated projections, d2, which act as strikers for the latch when it is used as such, and the hasp rail, d, which confines the latch when acting as a bolt, as shown and described.

73,079.—MACHINE FOR PRESSING BRICK.—Wm. H. Coombs, Fort Wayne, Ind.

I claim, 1st, The improved brick-pressing machine, constructed and operating substantially as herein described.

2d, In combination with the mold, in which the bricks are pressed, and a plunger or piston, operated by a crank and pitman, to press the brick in the mold, the movable back piston, P', moved by the means and in the manner substantially as herein described, to remove the pressed bricks from the mold.

3d, In combination with a plunger or piston, operated by a crank and pitman to press the bricks in the mold, the feeder, I, operating in the manner and by the means substantially as herein described, and for the purpose set forth.

4th, In combination with the mold and a pressing plunger or piston, the elastic backing, O', substantially as and for the purpose set forth.

73,080.—MELODEON.—Wm. Cooper, Deposit, N. Y.

I claim, 1st, Graduating the dip or depression of the keys, by mechanism controlled by the receiver, substantially such as herein described, for the purposes specified.

2d, The two receivers, A, and the two exhausters, with their operating pedals, so combined that the aforesaid receivers may be worked, either together or separately, at the pleasure of the player, substantially as herein set forth.

3d, The slide, b, or equivaleut device, arranged in such relation with the two receivers that the latter may be either separated or made to communicate with each other, substantially as and for the purpose herein set forth.

73,081.—CULTIVATOR AND PLOW.—Wm. H. Damron, Robt. H. Massey, and Lorenzo F. Whitman, Macomb, Ill.

We claim, 1st, The combination of the wheel, a, with the wrist, e, sliding chaser, e', and cross beam, a', as and for the purpose described.

2d, The combination of the plow beam, c, with the sliding crotches, i, the cross beam, a', the guide, n, and slotted cross beam, o, substantially as set forth.

3d, The combination of the plow beam, c, with the crotches, i, provided with the holes, l, and pins, k, as and for the purpose set forth.

73,082.—STRAIGHT EDGE.—Samuel Darling, Bangor, Me.

I claim, 1st, A straight edge, hardened at its edge or edges and not at its center, substantially as described.

2d, Also, a straight edge, having a hardened edge or edges, and admitting, when warped by hardening, of being brought into true, substantially as described.

3d, Also, a straight edge made of two or more thin pieces, having one or both edges hardened for the purpose of making it thicker, substantially as described.

4th, Also, a straight edge composed of a thin plate, with hardened edge or edges, and a supporting bed or plate, substantially as described.

5th, Also, a straight edge composed of two or more hardened straight edges secured end to end upon a supporting bed plate.

6th Also, a straight edge, when constructed as herein set forth, whether the same be used as a single edge or with two opposing edges, as in a gage, substantially as described.

7th, Also, the mode, herein described, of undergraduating the straight edges to compensate for the stretch in hardening.

8th, Also, the process, herein described, of reducing the graduated edges to the proper standard by tempering.

73,083.—STEAM GENGRATOR.—John H. Duhme, Cincinnati, Ohio.

I claim the steam boiler, constructed as described, consisting of the sections, C, placed one above the other, and connected together at the ends by means of the pipes, a, said sections consisting each of the corrugated longitudinal plate, c, and corrugated transverse plate, d, secured together at their points of intersection, all arranged as described as and for the purpose specified.

73,084.—BOILERS FOR HEATING APPARATUS.—C. R. Ellis, Brooklyn, N. Y.

I claim a series of pipes for a hot-water heating apparatus, formed with the waterway thimbles near the ends of the tubes, in combination with the pipe, g or h, having a range of thimbles on one side, the whole being connected together by tie rods, as set forth.

73,085.—WATER-PROOF SAFE.—J. P. Ellis, Flushing, N. Y.

I claim a water-proof safe or receptacle for papers and other valuable documents, constructed substantially as herein specified.

73,086.—POTATO PLANTER.—Henry Farmer, Pontiac, Mich.

I claim the arrangement and combination of the said iron fingers, hopper, and plow, acting together as and for the purpose above specified.

73,087.—CULTIVATOR.—Wm. Frantz, Piqua, Ohio.

I claim the combination of the standards, D D', and shovel plows, E E', adjustably attached to cross beams, C C', and the adjustable rake, F, arranged to operate substantially as set forth.

73,088.—PICTURE AND CURTAIN KNOB.—J. Gardner, New Haven, Conn., assignor to Samuel Peck & Co.

I claim, as a new article of manufacture, a picture or curtain knob, or knob for like purposes, made of the material and in the manner substantially as herein specified.

73,089.—LUBRICATING COMPOUND.—E. J. Gerdom and C. W. Schindler, Albany, N. Y.

We claim a lubricating compound made of the ingredients above specified, and having the property that it will melt at a temperature of from 100° to 110° as set forth.

73,090.—FIELD FENCE.—I. A. Gormly, Bucyrus, Ohio.

I claim the combination of metal posts, anchors, and braces, with dowel pins and wedges, substantially as described.

73,091.—BASE BURNING HOT-AIR FURNACE.—James Gray, Albany.

I claim, 1st, In a base burning stove or furnace, which has a supply cylinder, an escape passage from the chute, J, through the horizontal pipe, d', or the hollow ring, e', into the flue, F, substantially as described.

2d, Providing the chute, J, leading through one side of the external casing into the cylinder, E, with a damper or valve, g, substantially as described.

3d, The construction of the double-wall cylinder, D D', annular chamber, d d, and air-passages, f f, substantially in the manner shown and described.

4th, The combination of the magazine, E, outer casing, H, with the hollow open-work section, F, and the annular chamber, d d, with air passages, f f, crossing it, of a base burning air heating furnace substantially as described.

5th, The combination of the magazine, E, central exit flue, F', and ascending annular flue, d, leading from the fire chamber, substantially as and for the purpose described.

6th, Conducting the heated products of combustion, rising from the fire pot C, around and over the coal-supply cylinder, and discharging them into a central flue directly over the center of the said supply cylinder, in combination with warm-air chamber, G and G', such chamber being inclosed by wall H, all for the purpose of heating air which is to be used for warming apartments, substantially as described.

7th, Making the iron protector or the guard plates, k k, of the fire bricks, or their equivalents, portable in segments, so that they may be removed through the lower end of the magazine, E, substantially as described.

8th, In the construction of a base burning, air heating furnace, having a magazine, E, an annular circulating air chamber, and an annular smoke passage, both surrounding said magazine, and situated between the same and the annular wall, D, the inclined chute or passage, J, provided with a valve, g, and gas-escape conduit, and adapted to serve as a means for introducing coal into the magazine from a point which is below the top of the outer casing, substantially as described.

9th, The flaring arched opening of the ash pit, A', formed by the nclined plate, a2, substantially as described.

10th, The combination of the sectional lining, h h, with annular circulating space, G, and jacket or wall, D', substantially in the manner described and shown.

11th, The combination of the magazine, E, damper or valve, g, the horizontal pipe or pipes, d', and the hollow ring, e', substantially as described.

12th, The arrangement of the flues, d' and e', so that they can be cleaned by using a flexible handled brush from inside of the door leading into the coal-supply cylinder or reservoir, substantially as described.

13th, In a base burning air heating furnace having a magazine, E, a doorway or passage, provided with a door or window, and opening into the combustion chamber through the outer casing of the furnace, substantially as described.

14th, In a base burning, air heating furnace having a magazine, E, a passage, covered by a door or window, and leading into the combustion chamber through and across the air chamber formed by the exterior case or wall and the outer wall of the furnace, substantially in the manner and for the purposes described.

73,092.—APPARATUS FOR DISTILLING AND RECTIFYING.—Calir Gresiuchna, New York city.

I claim the blow-off pipe, P, in combination with the cups, d1 d2 d3 d7, in the rectifier, G, substantially as and for the purposes described.

73,093.—RECIPROCATING BALL TOY.—Theo. D. Haehnlen, Philadelphia, Pa.

I claim the combination of the ring, A, the elastic cord, C, the ball, D, and handle, B, substantially as specified.

73,094.—CULTIVATOR.—W. O. Hargrave, Ripon, Wis.

I claim, 1st, The board, H, connected to the tongue, C, by the hinge, H, so that the drill teeth can be elevated by the driver, in the manner as set forth.

2d, The axle, A, with its blocks, D D D, between which are hinged the beams, E E E, provided with their shovels, e e e, when used in connection with the board, H, bars, d d, securing the horizontal resting bar, G, and operated by the rod, b, upon the beam, E, by the hinge, H', the whole constructed and used in the manner substantially as specified.

73,095.—WORM FOR GEARS.—Dennis Harrigan and Joel Whitney, Winchester, Mass.

We claim an endless screw or worm, with its threads so formed as to have their general direction from root to summit such that, if prolonged, they would meet at a point distant from the roots of the threads equal to the radii of the wheel they are intended to drive.

Also, the forming of these threads upon a body whose bounding lines, in a direction parallel with the axis of the worm, are concave, the radius of the concavity being equal, or nearly so, to the radius of the wheel to be driven.

73,096.—BEEHIVE.—Chas. Hastings, Dowagiac, Mich.

I claim the combination of the box, A, with an air chamber, a, and a series

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of movable comb frames, B B, with recesses, x x, said frames and recesses are covered with paper, C, or equivalent material, as and for the purposes specified.

73,097.—BRICK TRUCK.—Napoleon B. Heafer, Bloomington, Ill.

I claim a truck which is adapted for general use in a brick yard, consisting of a platform, A, with removable head and tail boards, A' A', mounted upon rollers, C C, and provided with a sliding hand tongue, E, and also means for attaching thills, F, substantially as described.

73,098.—PORTABLE FENCE.—L. F. Henderson, Freeport, Ill.

I claim the uprights, A A, secured with cleats, F F, and to bases, B B, in combination with top rails, D, stakes, C, and lower rails, G, substantially as and for the purpose set forth.

73,099.—SPIRIT METER FOR DISTILLERS.—J. C. Horton, New York city, and James Milligan, Brooklyn, N. Y.

We claim, 1st, The method of ascertaining the quantity of spirits produced in a distillery in a given time by using, in combination with an automatic meter to measure the spirits passing from the worm, another automatic meter, to measure the beer passing from the fermenting cisterns to the still, said meters being arranged and provided with automatic registers, substantially as described.

2d, Also, the method of ascertaining the quantity of spirits produced by a distillery in a given time by passing the beer through an automatic registering meter on its way from the fermenting cisterns to the still, whether in combination with a meter to measure the distilled spirits or not, substantially as herein described.

73,100.—SHAFT COUPLING.—Geo. W. Hubbard (assignor to Cresson & Smith), Philadelphia, Pa.

I claim the combination of a clamp or griping coupling, A, constructed substantially as described, and provisional safety key, D, with the shafts, B and B', as and for the purpose set forth.

73,101.—PUSHING JACK FOR RAILROAD CAR.—Ezra Hutson, Brockport, N. Y.

I claim the hinged jaw, g, in combination with hinged lever, C, and hand lever, A, substantially in the manner specified.

73,102.—DEVICE FOR SHARPENING HORSESHOE CALKS.—Wm. M. Jones, Horicon, Wis.

I claim the within-described V-shaped file, constructed and used substantially as and for the purpose specified.

73,103.—WASHING MACHINE.—Joel Lee, Galesburg, Ill.

I claim, in combination with the box, with wheel, B, and crank, shaft for operating the pitman, rack bar, and pinion, E, the arrangement of the self-adjusting pins, G G, directly over the pedestal, I, constructed as described, and placed over the bottom of the box, as specified.

73,104.—BREAD BOARD.—Wm. H. Lewis, New York city.

I claim the cutting board for bread, etc., formed with a recess or case for receiving the knife, as set forth.

73,105.—FILTER.—Joseph N. Lighthall, Joliet, Ill.

I claim a filter consisting of a vessel, A, provided with a central inlet pipe, C, a removable cover, B, perforated partitions, F G, and an outlet pipe, G', substantially as described.

73,106.—PANTALOON PROTECTING GUARD.—E. Lindsley, Cleveland, Ohio.

I claim, 1st, The guard plate, A, loops, B B, and pins, C, when combined and arranged in relation to the pantaloons, substantially as and for the purpose described.

2d, The button, D, and guard, A, arranged as described, in relation to the boot and pantaloons, substantially as and for the purpose set forth.

73,107.—BROOM.—H. Lumbard (assignor to himself, G. E. Gerts, and John Scmidt), Chicago, Ill.

I claim the arrangement of the reeds on the wedges, B B, and the manner of securing them to the block, A, by means of said wedges, substantially as and in the manner herein set forth.

In combination with the above, the rivets, C C, and plates, D D, arranged as described and specified.

73,108.—CURTAIN FIXTURE.—T. J. Marinus, Independence, Iowa.

I claim, 1st, The automatic clamp, G, when constructed substantially as and for the purpose specified.

2d, The combination of the automatic clamp, G, wire, H, and cord, E, all arranged and operating in the manner and for the purpose set forth.

73,109.—FIBROUS MATERIAL FOR THE MANUFACTURE OF ROPES, CORDS, AND FOR COVERING WIRES, CORDS, ETC.—Henry A. Martin, Roxbury, assignor to Joseph H. Adams, Boston, Mass.

I claim a fiber formed from gutta percha, for the purposes set forth.

73,110.—SCREW MACHINE.—B. A. Mason, New York city.

I claim, 1st, The receiver, n, and pusher, 11, in combination with the blank carrier, f, substantially as and for the purposes set forth.

2d, The ring-blank carrier, f, in combination with the ring tool holder, d, and cutters, r, the holder passing through the carrier, as and for the purposes set forth.

3d, The arrangement of devices as described for operating the pusher, 11, as and for the purposes set forth.

4th, The removable chucks, constructed and applied as set forth, in combination with the ring-blank carrier, f, as and for the purposes specified.

5th, The delivery slide, w, actuated as specified, in combination with the ring-blank holder and ring-tool holder, as set forth.

6th, A machine for cutting screws, in which the tools and their supporting ring are moved continuously by gearing that is connected with the screw driver by a changeable gearing all arranged substantially as set forth so that the pitch of the screw thread may be varied, as specified.

7th, The cams, k and 8, or projections applied to the ring, d, substantially as specified in combination with the parts that supply the blank, force it into the blank holder, and move the blank holder and the screw driver, the parts being arranged and operating substantially as set forth.

73,111.—GOVERNOR.—T. B. McConaughey, Newark, Del.

I claim, 1st, The hinged arm, D, in combination with hook, e, and tripping ever, E, when constructed and operating substantially as set forth.

2d, The governor pulley, h, when driven by and combined with pulley, g, and belt, H, in the manner substantially as specified.

73,112.—GRAIN MEASURE.—E. O. Melvin, Brooklyn, Wis.

I claim the combination of the bifurcated chute, A a a', with the gate, B, lever, L, rod, S, and the registering apparatus above described, substantially as described for the purpose herein set forth.

73,113.—RAILWAY-SWITCH ALARM.—I. Ferguson Morsell, Stamford, Conn.

I claim the combination with the switch bar and lever, capstan or other device for operating the same of a clock movement provided with an alarm gong attachment, substantially as and for the purposes herein specified.

73,114.—REEDS FOR ORGANS, ETC.—William Munroe, Cambridge, Mass.

I claim, as an improved manufacture, musical reeds in which the tongue is secured in place between two projections, in the manner substantially as described.

Also the combination with the tongue secured in place substantially as described of a depression in the middle or elevation at the ends of the bed to which it is secured, substantially as and for the purpose set forth.

73,115.—MACHINE FOR MAKING PASTE.—G. G. Noah, Boston, Mass.

I claim, 1st, Introducing steam into the perforated arms and into the contents of the tub, for the purpose above described and in the manner substantially as set forth, or by any equivalent means.

2d, The combination of arms attached to the shaft wholly perforated or partly perforated and partly not perforated, for the purpose above described and in the manner substantially as set forth.

73,116.—SHINGLE MACHINE.—D. L. Peacock, Rockport, Ind.

I claim, 1st, A cutter frame composed of two parallel plates, m m', the upper one holding a knife, N, and the lower one having a raised bed, m''', arranged and combined substantially as and for the purpose specified.

2d, The combination of a cutter frame having tapering arms, t t, with the movable planer, G, bearing in hinged arms, H H, substantially as and for the purpose specified.

73,117.—FRICTION ROLLER.—C. W. Pierce, Albany, N. Y.

I claim the collars, A A, made in two parts and provided with slots or openings in which the rollers, D D, are held, as and for the purpose set forth.

73,118.—SKATE SHARPENER.—B. F. Prettyman, Alexandria, Va.

I claim, 1st, The adjustable guides, B B, in combination with the adjustable file or cutting tool, E, substantially as described and for the purpose set forth.

2d, The combination of the file or cutting tool, E, and key, F, when the same are constructed and arranged substantially as described.

73,119.—SEWING MACHINE.—George Rehfuss, Philadelphia, Pa., assignor to the American Buttonhole, Cording, Braiding and Embroidering Machine Company, New York city.

I claim the combination of the upper and lower eye-pointed needles when the movements herein described are imparted to the two needles so that by their joint action they may produce with two threads the stitch herein described in the body or on the edge of a fabric.

73,120.—HINGE.—Reuben Reiber, Lebanon, Pa.

I claim, 1st, The pivoted plate, c, with screw hole to fasten it to the shutter or other object in combination with the leaves, A A', and pins, a a, all constructed and arranged and operating substantially in the manner and for the purpose described.

2d, The right and left-hand hinge leaves, A A' b b', fastened together by a pin, a, which has a head, a', and to which head a plate, c, is pivoted, all substantially in the manner and for the purpose described.

73,121.—TICKET HOLDER.—N. J. Richardson, Lowell, Mass.

I claim, 1st, As a new article of manufacture, a ticket holder formed of a single wire, in the manner described.

2d, The holding spring or clamp, E, arranged and operating as described.

73,122.—GLASS LAMP.—D. C. Ripley (assignor to Ripley & Co.), Pittsburg, Pa.

I claim a lamp which is constructed with a pressed base, A, and one or two handles, B, and a globe, C, blown thereupon, substantially as described.

73,123.—MACHINE FOR HANDLING OR PILING BRICK.—James Sangster, Buffalo, N. Y.

I claim, 1st, The partitions, B, when made movable by means of the handles, C, and pins, D, substantially as and for the purposes herein described.

2d, Also, in combination with the above, the springs, G, so arranged as to force said partitions, B, apart, substadtially in the manner and for the purpose herein described.

73,124.—APPARATUS FOR GENERATING GAS.—D. F. Scheaf, Dayton, Ohio.

I claim, 1st, The arrangement of the tank, A, pipe, C, and stove, B, in such a manner that the made gas is passed back through the oil tank, the various parts being constructed and operating substantially as set forth.

2d, The arrangement of the receiver top with chain, N, lever, P, and pipe, C, provided with a stop cock in such a manner that the flow of oil to the generator is regulated by the rise and fall of the receiver top, substantially as and for the purposes specified.

73,125.—CHURN.—Conrad Schifferly, Bourbon, Ind.

I claim, in combination with the dasher, b, the saucer-shaped disk, e, as and for the purpose described.

73,126.—DIVIDER AND CALIPER.—E. S. Scripture, Brooklyn, N. Y.

I claim, 1st, The wedge-shaped circular rib, R, and groove, R', secured by a set screw, s, or an equivalent thereof, for the purpose substantially as described.

2d, Also adjusting the leg, B'', of the caliper by means of a set screw, c, in the manner as above set forth and shown in the drawings at Fig. 1.

3d, Also a universal divider with braces, 1 2 3 4, and having the inner surfaces or disks of the head, A, corrugated or ribbed and grooved, as shown at Figs. 3 and 4, for the purpose as above set forth.

73,127.—CLOCK CALENDAR.—J. K. Seem, Canton, Pa.

I claim the construction and arrangement of the wheels, B C D, and the plate, d, substantially as described for the purposes set forth.

73,128.—SWING.—B. F. Shaffer, Dayton, Ohio.

I claim, in combination with the seat, g g, of a swing, the hinged pedal attached to the swing and the cords, c c, fastened to the pedal and carried over pulleys on the swing frame, h h', and then fastened in front of the point of suspension of the swing, said several parts being respectively constructed and arranged substantially as set forth.

73,129.—GATE.—Franklin R. Sherman, Dowagiac, Mich.

I claim the frame, E, used in combination with the gate, the wheels, G and H, and the post, C, substantially as and for the purpose set forth.

73,130.—GARBAGE CAN OR VESSEL.—William Shires, Cincinnati, Ohio.

I claim a garbage vessel consisting of the sheet-metal body, A, wooden staves, B, and base, C, for the purpose set forth.

73,131.—MACHINE FOR BRAIDING WHIP LASHES.—Phineas L. Slayton (assignor to himself and Almet Reed), New York city.

I claim, 1st, The circular disks, F, with slots, h, gearing into each other to carry the braiding fingers, herein described, constructed, arranged and operating as set forth.

2d, The braiding fingers herein described traveling in guide ways, a a, with their ends pointing inward and approaching near to the center of the hollow sphere herein described, all constructed, arranged and operating substantially as and for the purpose set forth.

3d, The oscillating guide blocks, s s, the the curved plates, n n', and the pin, o, in combination with the plates, i i', constructed, arranged and operating substantially as described.

73,132.—WAGON PROTECTOR.—G. R. K. Smith, Brooklyn, N. Y.

I claim the construction, application and arrangement of a protecting guard, substantially as and for the purposes described.

73,133.—SAFETY PADLOCK FOR RAILROAD CARS.—George W. Stevens, Albany, N. Y.

I claim the lock composed of the shell, A, yoke, B, and springs or spring catches, C, combined and operating in such manner that the lock may be detached only by severing the yoke, substantially as herein set forth.

73,134.—BARREL CHURN.—S. H. Swasey, Morristown, Vt.

I claim, 1st, A float frame made to fill or nearly fill the diameter of the barrel or churn when provided with floats extending to or nearly to the central float arbor and operating in connection with said float arbor, substantially as described.

2d, The central float arbor provided with floats alternating with those on the float frame so arranged that it may be made to rotate with the float frame or held stationary when desired, substantially as and for the purposes described.

3d, The means for adjusting or setting the float frame and float arbor, whereby the floats may be set or held in the same plane with or at right angles to each other, for the purposes and substantially as described.

4th, The adjustable shaft, b, provided with the squared end and with the grooves, c c1, for controlling the relative operation of the float arbor and frame, substantially as described.

5th, The grooved perforated pivot, b1, provided with the squared end fitting in the float arbor, whereby said arbor may be held stationary for working the butter, substantially as described.

73,135.—MEDICAL COMPOUND.—D. W. Taylor, Bell county, Texas.

I claim the preparation or medicine herein described for the purpose set forth.

73,136.—PADLOCK.—M. P. Thatcher, Pontiac, Mich.

I claim the arrangement of the plates, A and B, with their shafts and cylinders as constructed and used in combination with the wheels, F F, as and for the purpose specified.

73,137.—MACHINE FOR TREATING ORES OF GOLD AND SILVER WITH VAPOR OF MERCURY.—William A. Thompson, New York city.

I claim, 1st, The cylinder, A, when suspended upon hollow trunnions, H, one of which is connected with a retort for vaporizing mercury and the other with a steam generator and so suspended that one end may be turned down to allow the contents to be drawn off, substantially as set forth.

2d, The cylinder, A, suspended upon hollow trunnions, and constructed with opposite windows, G, and openings, D E and F, and used in combination with the stirrer, B, substantially as and for the purpose set forth.

72,138.—APPARATUS FOR PREPARING PAPER STOCK.—Joel Tiffany, Albany, N. Y.

I claim, 1st, The use of a strong, close vessel for heating the entire liquor to be used in the reducing vessel to its maximum heat before introducing the same into the reducing vessel in combination with the reducing vessel, substantially in the manner and for the purpose above described.

2d, The use of a close vessel, B, in combination with a reducing vessel, G, to be used with their several connecting pipes, substantially in the manner and for the purpose above described.

73,139.—WATER-PROOF FABRIC FOR THE MANUFACTURE OF TRAVELING BAGS, TRUNKS, CARRIAGE TOPS, AND OTHER ARTICLES.—William H. Towers, Boston, Mass.

I claim, 1st, The improved fabric, made substantially as herein described.

2d, The combination of one or more thicknesses of paper with a woven fabric and finishing the same with enamel, substantially as herein described.

3d, The manufacture of traveling bags, trunks, valises, table covers, carriage tops, and similar articles, by combining enamelled paper with other textile fabric, substantially as described.

4th, The application of glycerin to compound fabrics of paper and cloth, such as herein described, to render them tough and pliable, substantially as set forth.

5th, The combination of gums, resins, paraffine, collodion, drying oils, and the like with a fabric composed of paper and cloth, substantially as described.

73,140.—CAR COUPLING.—Jacob N. Vandegrift, Stephen T. Vandegrift, Smith D. French and Elias S. Stone, Wabash, Ind.

We claim, 1st, The method and means described for self-coupling cars of a railroad train, to wit, by forcing the link held by the coupling bolt of the bumper of one car up to and past the bevelled coupling bolt, D, of the bumper of the other car which coupling bolt is fixed by a rivet, P P, to an attachment, E, which tilts as the coupling bolt rises and falls, and which attachment is kept in place by the spring, b t.

2d, The method and means above described for uncoupling and detaching railroad cars at will whether the cars are in motion or at rest, viz., by the use of a cord or chain, R, in reach of the conductor and attached to a compound lever, U m T, affixed at U to the side of the bumper and at T to the attachment by which the coupling bolt is raised or depressed so that the coupling bolt may be raised and depressed at will.

3d, The method and means above described for uncoupling and detaching railroad cars when run off the track, viz., by using corresponding couplers as above described on the bumpers of each car and so that when the forked lever, F, of the bumper of one car rests on top of the spring, i, of the forked lever on the bumper of the other car and being moved laterally pushes the wheel, I, at the end of the attachment of the coupling bolt against the inclined planes, O, of the forked lever the effect will be to depress the coupling bolt and detach the cars.

73,141.—SHOEMAKER'S HAMMER.—Jacob Vigeant, Marlboro, Mass.

I claim constructing the hammer with the inclined striking face set at an angle with the handle, substantially as shown and described.

Also combining with the handle having uniform opposite sides the two inclined faces arranged with respect to each other and to the handle, substantially as shown and described.

73,142.—ATTACHMENT FOR HOPPER OF GRINDING MILL.—David C. Walters, Warsaw, Ind.

I claim, 1st, A bell so operated and arranged within the hopper that when surrounded by the grain it will be held stationary but when uncovered will be caused to ring, substantially as and for the purpose specified.

2d, The loaded lever, D, and connecting rod, d, so combined with the float, s, in the bottom of the hopper that the said lever may operate when the float is released from the weight of grain in the hopper, substantially as and for the purpose specified.

3d, The bell, F, wire, f, and adjustable annular block, E, in combination with the standard, C, rod, g, and bar, G, substantially as and for the purpose specified.

73,143.—SULKY PLOW.—Joseph Warwick, Springboro, Ohio.

I claim, 1st, The device for lowering and raising the plow beam consisting of the plates, g and i, the former being slotted, pivoted as described, adjusted by means of the set screws, k, and operated by means of the lever, G, and bow rack, H, substantially as described.

2d, The screw shank, s, of the sheath, k, and nut, t, in combination with the standard, P, attached to the land side, L, by means of the bolt, p, for the purpose of lowering the plow point, substantially as described.

3d, The mold board, I J, with its part, J, bent around the sheath and secured to the same, substantially as and for the purpose described.

4th, The share, M, with its bent part, N, connected to the land side, L, and with the latter forming the point, attached and constructed substantially as described.

5th, A plow with separate mold boards and share both attached to the sheath in such a manner that no bolt or rivet is used on their surface, substantially as described.

73,144.—FLOCK DUSTER.—Miles Waterhouse, Passaic, N. J.

I claim the rotating brush cylinder, d, with its spirally-arranged brushes and beaters, d' d' d', when combined together and with the screen, e, and the openings, c and r, in the manner and for the purposes shown and described.

73,145.—LAMP.—Hiram B. Wellman, Allegheny City, Pa.

I claim the pipe, C, for oil, and the pipe, E, for water, having chamber, D, between them, when arranged in combination with the lamp, A, and used for the purposes set forth.

73,146.—PROCESS OF MANUFACTURING WHITE OXIDE OF ZINC.—Samuel Wetherill, Philadelphia, Pa.

I claim passing the products of combustion from the furnace into an auxiliary chamber or chambers containing incandescent carbon, and thence, through the incandescent coals, into contact with a hot blast, substantially as and for the purposes described.

73,147.—APPARATUS FOR THE MANUFACTURE OF WHITE OXIDE OF ZINC.—Samuel Wetherill, Philadelphia, Pa.

I claim the combination, with the furnace, of one or more chambers, communicating with said furnace, and adapted to contain incandescent coals, and permit the passage of the products of combustion from the furnace through the said coals, substantially as and for the purposes described.

Also, in combination with the incandescent chambers, hot-air flues, into which the vapors of zinc may pass from said chambers, to mingle with and be carried off by a hot blast, substantially as described for the purposes set forth.

Also, the arrangement of the blast tubes g, immediately over the furnace and communicating with the chambers, E E, as and for the purpose described.

73,148.—HAMES-TUG BUCKLE.—Ludwig Wetzell, Washington, D. C.

I claim the hames-tug buckle, g, with loop cover, a, and pin, f, when the parts are constructed, connected, and fitted to produce the result, substantially as described within.

73,149.—CARRIAGE HARNESS.—Ezra Wilder, South Hingham, Mass.

I claim making the parts of the saddle relatively adjustable, substantially as shown and described.

Also, making the parts of the hames relatively adjustable laterally, substantially as above described.

73,150.—WATER WHEEL.—Courtland B. Wilson and Abner S. Houghton, Trenton, N. J.

We claim the combination of the top plate, E F, and the rim, G H, with the movable self-adjustable buckets, L L, stays, K K, the groove or channel, O O, and stops or abutments, P P, all substantially as above described, and for the purpose set forth.

73,151.—CHEESE BOX AND BUTTER TUB.—Frank H. Wilson, Wethersfield, N. Y.

I claim the arrangement of the box or tub, A, with its cover, B, box, A, having a flat metal shoulder, d, on each side, near its top, and cover, B, having similar metal shoulders, e, on its inner flange, as and for the purposes set forth.

73,152.—VISE.—Linus Yale, Jr., Cooperstown, N. Y.

I claim, 1st, A screw capable of operating the moving jaw of a vise, in combination with a nut having an inclined plane thereon, and an inclined plane attached to the moving jaw, these parts being and operating in combination, substantially as described.

2d, In combination with a rack attached to the stationary jaw of a vise, and an inclined plane attached to the moving jaw thereof, a racked nut, provided with a screw, and an inclined plane, the combination being substantially such as described, and operating substantially as set forth.

3d, In combination with the jaws of a vise, a screw, a rack, and a racked nut, a spring, located as described, and operating in combination with the parts with which it is combined, substantially as described, to control the position of the rack, substantially in the manner and for the purpose specified.

Lastly, a sectional collar, in combination with a moving vise jaw, and the screw which operates it by means of recesses therein, the combination being and operating substantially as hereinbefore set forth.

73,153.—PUMP.—Frederick Yeiser, Danville, Ky.

I claim the rod or shafts, D D, provided with agitating cross-pins, and used with the stock, A, substantially as and for the purpose set forth.

73,154.—TIME ALARM.—Louis Baum, Washington, D. C.

I claim an alarm, arranged to be operated by an ordinary watch, through the medium of the weight, T, cord, I, and revolving shaft, F, arranged to operate substantially as described.

73,155.—CAR SEAT LOCK.—G. W. R. Bayley and John McCluskey, Algiers, La.

We claim, 1st, The bar, A, and pins, a, disposed on the said bar, a, substantially as above described, in combination with the lips, E, or their equivalent, in the manner and for the purpose substantially as above set forth and described.

2d, The said bar, A, in combination with the half cap, F, and padlock, G, in the manner and for the purposes above set forth and described.

73,156.—BUCKWHEAT HULLING MACHINE.—Joseph Baysore, Freeport, Ill.

I claim, 1st, The arrangement of the tightening bar, N, spindle step, c, knockers, d, for operating the trash screen, spindle, a, bail, g, fan blower, E, and curved spout, G, as herein shown and described.

73,157.—STRAW CUTTER.—A. J. Bell, Bloomingburg, N. Y.

I claim the toothed cutter blade, C, in combination with the frame, G, guides, F, and box, B, all constructed, arranged, and operating substantially as described.

73,158.—ATTACHMENT FOR PLOW.—Wm. Bennett, Rushville, Ind.

I claim, 1st, The vertically-adjustable fender, H, attached to the bar, E, sliding in the guide, F, when such bar is attached to the spring, J, whose forward end is secured to the beam, A, in such a manner that the fender shall yield to a clod of earth, and be thrown into the proper position by the spring, J, after passing such clod, as herein shown and described, for the purpose specified.

2d, The spring, J, when secured to the sliding bar, E, bearing the pendent arm, G, and fender, H, for the purpose of allowing a yielding movement to the fender when brought in contact with clods of earth, as herein shown and described.

73,159.—AUTOMATIC WATER GATE.—H. Besse, Delaware, O.

I claim, 1st, A water gate, A, pivoted at or near its lower margin, and provided with a projecting float, B, all substantially as shown and described, and operating as and for the purpose set forth.

2d, The latch, e, or other equivalent device, operated by a float, m, or other equivalent device, substantially as shown and described, and in combination with the water gate, A, all as and for the purpose set forth.

73,160.—SLUICE BLANKET.—Abraham Block, San Francisco, Cal.

I claim a sluice blanket provided with woven ribs, substantially as herein described.

73,161.—WATCH.—George A. Bowen, Trenton, assignor to himself and Samuel C. Parrott, Bordentown, N. J.

I claim the ring, c, formed within the drum, A, and fastened to the main spring, B, when combined with the catch, E, and shoulder, a, substantially as and for the purposes herein shown and described.

73,162.—HOLLOW AUGER.—Albert Brush, East Constable, N. Y.

I claim, 1st, The hollow auger, D, provided with the knives, e e', for forming upon spokes the tenons, b, and shoulder, s, adapted to fit into the recess in the felleys formed by the auger, C, having the extended cutting lips, c, and the adjustable guide, d, constructed to operate as herein shown and described.

2d, The auger, C, when provided with the projecting cutting lip, c, and adjustable gage, d, constructed and operating as herein described, for the purpose specified.

73,163.—PROCESS OF MIXING IRON AND STEEL.—James Cartwright, Youngstown, Ohio.

I claim the process of mixing and combining steel and iron, substantially as herein described.

73,164.—KNITTING MACHINE.—J. Chantrell, Bristol, Conn.

I claim, 1st, The manner, herein shown and described, of connecting the arms of the sinkers, m, by means of annular plates, r', and rivets, as set forth.

2d, The needle carrier, G, when connected with the sliding rack, F, and with the plate, H, in such a manner that a combined longitudinal and transverse sliding motion is imparted to it, substantially as herein shown and described.

3d, The reciprocating thread carrier, R, when arranged as described, in combination with the arms, e1, needles, I and J, and sinkers, W, all made and operating substantially as herein shown and described.

4th, The devices herein shown and described, for communicating motion from the needle carrier, G, to the bar, P, holding the thread carrier, said devices consisting of the spring plates, a1 b1, cams, c1, and stationary cams, d1, all made and operating substantially as herein shown and described.

5th, The devices herein shown and described for adjusting the stroke of the sinkers, W, consisting of the grooved plate, V, vertical slides, g', eccentric shafts, h', gear wheels, i', and sliding rack, j', all made and operating substantially as herein shown and described.

6th, The combination of the perforated disk, d, adjustable connecting rod g, and the segment, D, as and for the purpose set forth.

73,165.—WHIP.—J. S. Cook, West Groton, Mass.

I claim a whip having its lash secured or hung to its stick, through a swivel ring or eye, substantially as and for the purpose described.

73,166.—CORN PLOW.—S. H. Cox and William H. Pence, Matton, Ill.

We claim, 1st, Connecting the forward ends of the plow-beams, H, to the frame, C, by means of the clevis, I, constructed as described, and the long adjustable bolt, J, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the lever, O, and toothed pawl, P, with the shaft N, grooved segments, M, chains, L, and beams, H, in connection with the clevises, I and long bolts, J, for raising the plows vertically from the ground, substantially as herein shown and described.

3d, The combination and arrangement of the plows, V, having cutters, v', attached to them, and turning the dirt from the hills, plows, W, running at a lower level than the plows, V, and turning the dirt toward the hills, standards, R and T, and beams, H, with each other, substantially as herein shown and described, and for the purpose set forth.

73,167.—FLOUR BOLT.—William Craig, Uniontown, Pa.

I claim the bolt, constructed as described, having the partition, v2, between the outer and inner bolting cloths, v v1, operating substantially as described, for the purpose specified.

73,168.—LOW WATER ALARMS FOR BOILERS.—F. S. Davenport, Jerseyville, Ill.

I claim, 1st, The construction and arrangement of the hollow tube, C, provided at its upper end with the screw plug, D, having valve seat, g, the hollow tube, E, fitting into tube, C, and having the opening, j, communicating with the interior of the float, and provided at its upper end with the pointed valve, h, all operating as described, for the purpose specified.

2d, In combination with the outer and inner tubes, C and E, when arranged as described, the valve seat, g, the valve, h, and the orifice, j, substantially as and for the purposes set forth.

73,169.—BROOM OR BRUSH HOLDER.—Anthony G. Davis (assignor to himself and Augustus N. Woolson), Watertown, Conn.

I claim the patent broom-brush holder, constructed as described, consisting of the curved spring arms, A, made in one piece, and secured in position under the bar, B, and slotted to receive the sliding bar, C, as herein described for the purpose specified.

73,170.—TIRE SHRINKER.—Edward B. Decker, Bedford, Ill.

I claim the combination of the operating lever or handle, D, pivoted straps, C and E, pivoted levers or bars, A and B, having clamps with stationary jaws, F G, and pivoted eccentric jaws, H I, attached to them, with each other, substantially as herein shown and described, and for the purpose set forth.

73,171.—EXTENSION CLOTHES POST.—George Dittenhaver, Napoleon, Ohio.

I claim the combination of the sliding part, B, provided with the spring pawl, b, and having the removable clamp, D, secured to its upper end, and

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...gulated by means of the thumb screw, F, all constructed and operating substantially as described for the purpose specified.

73,172.—CULTIVATOR.—Edwin Doolittle, Pawnee, Ill.

I claim, 1st, The hinged sides, M, friction wheels, N, and bent bar, E, with each other, and the plow beams, I, and with the beams or bars, D, substantially as herein shown and described, and for the purpose set forth.

2d, In combination with the above, the knees or bars, O, cross bar, P, and lever, R, all arranged and operating in the manner and for the purpose set forth.

3d, The combination of the adjustable connecting and brace bars, W, uprights, V, and plow-beams, I, when arranged to operate in the manner herein described and represented.

73,173.—CULTIVATOR.—John W. Doud, Forestville, Iowa.

I claim, 1st, The combination of the frame, C, strengthening braces, D, and diagonal plow beam, E, to which the standards, F, of the plows, G, are attached with each other, the said parts being constructed and arranged substantially as herein shown and described, and for the purpose set forth.

2d, Connecting the axle, B, to the tongue, I, of the frame, C, by the inclined bars, J, and jointed or link connection, K, substantially as herein shown and described.

3d, The combination of the cross bar, M, and adjustable chains, L, with the inclined bars, J, and frame, C, substantially as herein shown and described, and for the purpose set forth.

4th, The combination of the lever, N, chain, P, and bail or bar, R, with the frame, C, and axle, B, substantially as herein shown and described, and for the purpose set forth.

5th, The combination of the levers, S and T, with the frame, C, axle, B, and inclined bar, J, substantially as herein shown and described, and for the purpose set forth.

73,174.—DOOR HINGE.—Charles Dupre, Louisville, Ky.

I claim the hinge plates, a and b, furnished with the arms or ears, E E' and e, in combination with the pin, C, screw, D, and socket, F, or their respective equivalents, in manner as and for the purposes described.

73,175.—TIRE SHRINKING MACHINE.—James Elliott, Milford, Wis.

I claim, 1st, The combination of the connecting rod or chain, G, for opening the carriages, with the carriage, E, and cam levers, F, substantially as described.

2d, The slot, b, in the bed piece, B, and the groove, a, in the platform, A, making together a T-shaped groove, in combination with a T-shaped lug upon the carriages, all as substantially specified and described.

73,176.—BUCKLE.—Louis Elsberg, New York city.

I claim the buckle constructed as described, consisting of the buckling loop, A, having the flattened center, C, and bent edge, D, its extremities, B, bent at right angles to the center, forming bearings for the loop, E, the latter having the serrated tongue, I, fitting between the arms, B, upon the flat surface of the loop, A, beneath the edge, D, as herein described for the purpose specified.

73,177.—HAY KNIFE.—Charles A. Fisher, Geneseo, Ill.

I claim, as a new article of manufacture, the hay knife, when formed from a piece of metal, as shown and described, and provided with the handles, F G, as herein set forth.

73,178.—SEWING MACHINE.—David Forrest, Eastport, Me.

I claim the bent hand lever, D, in combination with the slide rods, e k, mounted on the base, b, and connected with the needle, a, and the looper, d, as set forth, the whole constructed and operating as herein described.

73,179.—HORSE HAY FORK.—C. E. Gladding, Troy, Pa.

I claim, 1st, In combination with a power hay fork, the connection, d, or its equivalent, formed of the parts, E F and G, or their equivalents, substantially as and for the purposes herein shown and described.

2d, In combination with the connection, D, or its equivalent, the bail, C, substantially as described.

73,180.—STRAW CUTTER.—J. F. Hammond, North Sudbury, Mass.

I claim, 1st, The combination and arrangement of the bevelled knives, L M N, with each other and with the sliding frame, D, and feed box, C, substantially as herein shown and described, and for the purpose set forth.

2d, The combinations of the slotted lever arms, S T, sliding frames, O, and sliding rake heads, S, one set or both, with each other, with the feed box, C, frame, B, and knife frame, D, substantially as herein shown and described, and for the purpose set forth.

73,181.—CULTIVATOR.—C. A. Harper, Wheeling, Ind.

I claim, 1st, The combination of the wheel, D', with the cultivator frame, A, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the spiral or screw plate, H, with the wheel, D', and with the cultivator frame, A B, substantially as shown and described, and for the purpose set forth.

73,182.—BURGLAR ALARM LOCK.—Samuel T. Heminway, Saratoga Springs, N. Y.

I claim the combination and arrangement of the pivoted lever, B, having its outer arm projecting through the aperture, T, on the top of the lock, the notched arm, A, secured to the verge, the spring, C, and arm, R, substantially as described, for the purpose specified.

73,183.—CAR AXLE BOX.—Geo. H. Henfield, San Francisco, Cal.

I claim the combination of the grooved caps, e e, the linings, a a, provided with pins, c c, and the shells, A A, arranged as and for the purpose herein described.

73,184.—STRAW CUTTER AND CORN SHELLER COMBINED.—Clark R. Hewett, Waupun, Wis.

I claim, 1st, The combination of the shafts, J N, bevel gear wheels, L M, cutter knives, P, and sheller teeth, S, with the balance wheel, O, of a combined folder cutter and corn sheller, substantially as described, and for the purposes set forth.

2d, The combination of the rubber springs, R, with the knives, P, and balance wheel, O, substantially as described, and for the purpose set forth.

73,185.—BOBBIN.—Albion P. Holmes, Great Falls, N. H.

I claim the spool or bobbin, having its solid wooden body surrounded by the metallic cylinder between the end disks, the bearings of said spool being composed of wood, as herein described, for the purpose specified.

73,186.—PAD CRIMP PRESS.—George Kennedy (assignor to himself and A. J. Tompkins), Clarksville, Iowa.

I claim, 1st, The frame or press, A B, adapted to receive the blocks, C D, constructed and operated substantially as herein shown and described and for the purpose set forth.

2d, The removable crimping blocks, C D, or their equivalent, constructed and operated substantially as herein shown and described and for the purpose set forth.

3d, The combination of the removable crimping blocks C D, or their equivalent, with the frame or press, A B, substantially as herein shown and described and for the purpose set forth.

73,187.—FRUIT JAR.—J. M. W. Kitchen, New York city.

I claim the vent plug when attached to an elastic band, or its equivalent, and arranged for operation substantially as described, for the purpose set forth.

73,188.—SPRING BED BOTTOM.—Gottlieb Koenig, Plymouth, Mich.

I claim the bars, C, the springs, D, and the regulating rods, E, constructed, combined, and operating with the platform, B, and the base frame, F, in combination with a bedstead, substantially as described.

73,189.—SNOW PLOW.—Charles Lusted, New York city.

I claim, 1st, The hinged oscillating plowshare, D, when made and operating substantially as and for the purpose herein shown and described.

2d, A snow plow provided with an oscillating share, D, which is hinged to the upper edge of a stationary share, C, and which has flanges b, at the ends, substantially as herein shown and described.

3d, The hinged share, D, of a snow plow, connected by means of a jointed rod or rods, g, with a crank or cranks, a, on the axle of the plow truck, as described, the crank or cranks being loose on the axle, and connected with clutches, so that the share can be made to oscillate or not, as set forth.

73,190.—HAY ELEVATOR.—Harvey McCown and Luther M. McCown, Enon Valley, Pa.

We claim, 1st, The carriage, E, constructed as described, when its bottom consists of the bar, E, hung at one end, e, of the carriage, its free end extending beyond the opposite side of the carriage, and notched at f, to fit over the catch, h, upon the pendent, i, said bottom, E, being held in position by means of the coiled spring, F, and released by the pressure of the hook, d, as herein described, for the purpose specified.

2d, The combination of the hinged and notched bottom, E, coiled spring F, hook, d, pendant, i, catch, h, rollers, C C, and side bars, a a, all constructed and arranged as described, for the purpose specified.

73,191.—ENDLESS CHAIN POWER.—William McCreery, Pittsburg, Pa.

I claim the arrangement of the shifting clutches, e e, the bevels, a a and b, the pulleys, c c1 c2 c3 c4, and the endless chain, d d, when applied as and for the purposes herein described.

73,192.—COMBINED HORSE RAKE AND HAY SPREADER.—Frederick E. Nearing, Brookfield, Conn.

I claim the frame, G, fitted loosely on the axle, B, and carrying the revolving rake, H, in combination with the loose pulley, E, and clutch, F, on the axle, B, and the lever bar, J, on the frame, G, with the spurs, g g, on the rake head, all being arranged to operate in the manner substantially as and for the purpose set forth.

73,193.—BAG FASTENER.—Daniel Overholtzer, Polo, Ill.

I claim the bag fastener constructed as described, consisting of the link, b, having an open hook at one end, between the sides of which the bend of the locking hook, d, is pivoted, in such manner that the link, C, when placed over the locking hook, will clamp the bend of said hook in the hooked end of the open link, b, as herein shown and described.

73,194.—WATER METER.—Walter Payton, Sewardstone Road, Victoria Park, England.

I claim the combination of the axles, b b, vanes, b1 b1, gear wheels, b2 b2, worm, d, gear wheel, f, worm, f2, gear, g, shaft, g1, worm, g2, and gearing for the operation of the indicators, e3, chambers, e a3 and a1, all arranged as described, for the purpose of measuring the passage or flow of liquids, or for raising and forcing fluids, or for obtaining motive power, substantially as herein shown and described.

73,195.—PRINTING PRESS.—C. Potter, Jr., Westerly, R. I.

I claim, 1st, The combination of the eccentric bearing, E, adjustable box F, segmental pinions, G, segments, H, lever, L, and cylinder, C, substantially as described, for the purpose specified.

2d, The wheel, K, and cam, c, in combination with the eccentric bearing, E, for the purpose of returning the cylinder after having been lifted to its original position before taking a sheet, substantially as herein shown and described.

73,196.—FEED GAGE FOR PRINTING PRESSES.—C. Potter, Jr., Westerly, R. I.

I claim the two screws, D D', and slotted guide plate, B, in combination with the box, composed of two parts, E E', fitted to the shaft, A, and all arranged substantially in the manner as and for the purpose set forth.

73,197.—CLEVIS.—E. M. Potter, Kalamazoo, Mich.

I claim the employment of the two pulleys, A and A', substantially as shown and described, in combination with the ropes or chains, D and D', and the clevis iron, C, or other equivalent device for the purpose of working three horses abreast in plowing or other equivalent operation, all as set forth.

73,198.—ICE SLEIGH.—John Rancevau, Carthage, N. Y.

I claim, 1st, The wheel, C, having its bearings in the hinged frame, in combination with the elastic strip, I, whereby the wheel is held upon the ice and permitted to conform to its irregularities, as herein set forth, for the purpose specified.

2d, The construction and arrangement of the pivoted brakes, K I, connecting rods, O, foot levers, E and N, and springs, P, substantially as described, for the purpose specified.

3d, The combination and arrangement of the spur wheel, D, hung in the hinged frame, gear wheels, E F G, elastic strip, I, brace, J, springs, P, foot levers, M N, connecting rods, O, pivoted brakes, K L, block, U, and thumb nut, V, substantially as described, for the purpose specified.

73,199.—PLATE-LIFTER.—D. E. Roe, Elmira, N. Y.

I claim, 1st, The combination of the spring, C, with the claws, A and B, substantially as and for the purpose shown and described.

2d, The loop, b, or other equivalent device for holding the claw, B, at a proper distance apart from the claw, substantially as shown and described.

73,200.—RAILWAY SWITCH.—W. L. Rogers, North Cornwall, and W. E. Crane, New Britain, Conn.

We claim, 1st, The bent or right angular levers, D D', rods, E E' F F', cranks, G G', pinions, a, and rack-bars, I I', all arranged and applied to a switch to operate in the manner substantially as and for the purpose set forth.

2d, The rods, J L, and tube, K, notched as shown, and provided with the spring, i, and plates, g h, in combination with the rods, M M', shafts, l l', pinions, m, and rack bars, N N', all arranged substantially in the manner as and for the purpose specified.

73,201.—BRICK MACHINE.—James Sangster and David P. Dobbins, Buffalo, N. Y., and John S. Richards, Erie, Pa.

We claim, 1st, The combination of the lug or projection, Q, and the movable jointed connection, D2, or its equivalent, when constructed and arranged substantially as and for the purposes herein described and set forth.

2d, Also, the projecting pieces or rims marked, F2, within the molds, in combination with the rims, G', or any equivalent thereto, on the upper perforated piston or pistons, I, substantially as and for the purposes herein described and set forth.

3d, The combination of the mechanism, X X, spring, Y, and cross bar, A' with the vertically moving perforated pistons, substantially as and for the purposes described.

4th, Also, the combination of the vertically moving perforated pistons, I, when the perforations in the lower pistons, G, are made larger than those in the upper pistons, for purposes substantially as herein described.

5th Also, the combination of the upper and lower perforated pistons, with the cams, R, and friction roller, D3, or its equivalent, substantially as and for the purposes herein described and shown.

73,202.—PRESERVE JAR.—F. Joseph Shefferly, Detroit, Mich.

I claim sealing a preserve jar by raising the cover in the neck of the jar, instead of lowering it, substantially as described.

73,203.—ENVELOPE.—F. Marion Shields (assignor to himself and James A. Jarnagin), Macon, Miss.

I claim the envelope, constructed as described, consisting of the parts, B C, provided with the wings, G G, and flaps, H H E E2, having their edges gummed, as shown and specified.

73,204.—THRESHING MACHINE.—John F. Skinner, Brasher Iron Works, N. Y.

I claim, 1st, The operating of the shoe, C, through the medium of the lever, G, and the cam composed of the double spiral thread or flange, c, on the pulley, H, substantially as shown and described.

2d, The spring, N, pulley, h, and lever, M, arranged in connection with the belt, L, and wheel, O, substantially as and for the purpose specified.

73,205.—BOLT CUTTER.—E. A. Sloat, Theresa, N. Y.

I claim the stationary cutter, A, the movable cutter, C, the lever, E, and the plates, B, constructed and arranged substantially as herein shown and described, for the purposes set forth.

72,206.—GATE.—Gaius P. Stebbins, Sparta Centre, Mich.

I claim the sliding gate, B, hung or suspended on rollers, a a, in combination with the weight, k, the pivoted bar, E, platforms, F F, and the pulleys, D j j', all arranged to operate in the manner substantially as set forth.

73,207.—UTERINE ELECTRODE AND ABDOMINAL SUPPORTER.—Albert J. Steele, New York city.

I claim, 1st, Wire electrodes, insulated and covered with sponge, substantially as shown and for the purpose specified.

2d, The straps, B, for sustaining the electrode in place, substantially as shown, and for the purpose specified.

3d, The form of the electrode having a ring, g' and stems, f f', attached thereto, substantially as shown and for the purpose specified.

4th, The form of electrode having the ring, g, and cross pieces, h h, substantially as shown and for the purpose specified.

5th, The form of electrode having a single stem, f", and cross piece, h, substantially as and for the purpose shown and described.

6th, Elastic straps, c c, in combination with the strap, B, substantially as and for the purpose shown and described.

7th, The abdominal belt, A, in combination with the above described electrodes, substantially as and for the purposes shown and described.

8th, The non-conducting plate, D, in combination with the wire electrodes, as hereinafter described, substantially as shown and for the purpose specified.

73,208.—TINNERS' FORMING MACHINE.—William Stine, Elmore, Ohio.

I claim the flaring gage, a, in combination with the rollers of a tinman's forming machine, arranged and operating substantially as and for the purpose herein described.

73,209.—PLOW.—James Urie, Evansville, Ind.

I claim, 1st, The standard, C, constructed as described, having the flange, c1, extending its entire length upon one side, and the horizontal part or land side forming two flanges upon its rear end, gradually decreasing in width toward the forward part, all cast in one piece, as herein described, for the purpose specified.

2d, The point, A, when cast in one piece as set forth in combination with the standard, C, constructed as described having the flange, c1, extending its entire length upon one side and the horizontal part or land side forming the flanges upon its rear end gradually decreasing in width toward the forward part all cast in one piece, as herein shown and described.

73,210.—SAW.—George Walker, Middletown, N. Y.

I claim the annular rivet, c, inserted in the side of the saw tooth engaging with the notches, a, upon the cutter, B, whereby the latter is held in the groove of the tooth, as herein shown and described.

73,211.—HORSE HAY FORK.—J. H. Walker, Grand Rapids, Mich.

I claim the vertical spring bolt, D', working in projections upon the side of the suspension bar, C, near its upper end and fitting into the notch, e, in the underside of the curved frame, B, passing through the mortise in the suspension bar, C, above the spring bolt, D', arranged and operating as described for the purpose specified.

73,212.—SCRAPER ATTACHMENT TO CARS.—E. B. Wells, Northampton, Mass.

I claim, 1st, The adjustable scrapers, D, held down upon the track by means of pressure upon the bar, H, the spring, E, permitting said scrapers to yield to the inequalities of the track, as herein set forth for the purpose specified.

2d, The construction and arrangement of the scrapers, C, attached to the end of the inclined springs, E, curved bar, F, stud, a, slotted and jointed rod, G, its sections, c d, pivoted to the ears, b b, the section, c, connected to the operating bar, H, as herein set forth for the purpose specified.

73,213.—VENTILATOR AND WINDOW SCREEN.—J. R. Wharry, Moundsville, W. Va.

I claim, 1st, The combination of the wire screen and frame, F G, shutters, C C', and window frame, as herein described for the purpose specified.

2d, The shutter, C C', metal bar, e, and lever, E, substantially as described when disposed without the lower part of a window frame, substantially as above set forth and described.

3d, The said shutter, C C', in combination with the slot, g', in screen frame, G, substantially as above set forth and described.

73,214.—MACHINE FOR SAWING LATHS.—Emery T. Wheeler and William H. Vaughan, Cannelton, Ind.

We claim, 1st, The adjustable rests, p p', in which are mounted feed wheels, u u', in combination with the sliding supporting rods, r r, and bars, s, all constructed, arranged and operating substantially as and for the purpose herein shown and described.

2d, The carriage, B, on which the vertical saw, b, and horizontal saw, a, are mounted when arranged to be moved on the ways, A A, by means of a rack and pinion and when arranged to operate a rod, l, through the medium of a pin, f, on the same, substantially as and for the purpose described.

3d, The rod, l, provided with pins, f f', and double incline, i, when arranged to be operated from carriage, B, in combination with the pawl, z, and gage ratchet wheel, y, constructed, arranged and operating substantially as and for the purposes set forth.

4th, The toothed feed wheel, u, to which motion is given by worm, w, on shaft, g, through the medium of clutch pulley, n2, on same shaft, substantially as described.

5th, The combination of the clutch pulley, n2, arm, v, gage ratchet wheel, y, and shaft, g', all constructed and arranged substantially as described.

73,215.—WATER WHEEL.—George W. Wheeler and George V. Allen, Hartford, Md.

We claim the combination of the three sets of buckets, a b c, and the inclined rim, d, and bottom, e, to form the wheel, C, in connection with the case, applied to the wheel, and all arranged substantially as and for the purpose specified.

73,216.—MARKER FOR SEWING MACHINES.—Joseph P. White, Savannah, Ga.

I claim, 1st, The spring catch, e, and handle, d, in combination with the presser, C, bar, c, and gage, A, all made and operating substantially as herein shown and described.

2d, The hemmer, D, composed of two pieces, h and i, constructed as set forth, in combination with its sliding supporting block, f, bar, B, and gage, A, as and for the purpose herein shown and described.

3d, The marker, E F, hinged to the sliding block, k, and provided with the spring, m, substantially as herein shown and described in combination with the presser, C, all made and operating as set forth.

4th, The adjustable gage, A, when provided with set holes, b b, in combination with the presser, C, handle, d, spring catch, e, adjustable sliding hemmer, D, and hinged and sliding marker, E F, all made and operating substantially as herein shown and described.

73,217.—CULTIVATOR.—Joseph Widman, Panola, Ill.

I claim, 1st, The detachable seat bars, E E, secured to the main frame, A, of the machine, substantially in the manner as and for the purpose set forth.

2d, The attaching of the front ends of the plow beams, G G, to the pendents, I, by means of universal joints, H, when this attachment is used in connection with the pivoted arms, O O, connecting bar, P, and lever, Q, for giving a lateral motion to the plows, substantially as described.

73,218.—BED BOTTOM.—S. J. Wingate, Decatur, Ill.

I claim the combination of the bars or levers, E, elastic straps or bands, L, and cross bars, I, with each other and with the slats, F, and frame of the bedstead, substantially as herein shown and described and for the purpose set forth.

73,219.—SHINGLE MACHINE.—Horace Woodman, Saco, Me.

I claim, 1st, The revolving table with its feeding and securing mechanism constructed substantially as described in combination with the rotary planer, V, and saw, C, as and for the purpose specified.

2d, The combination and arrangement of the outer grooved cylinders, K, adjustable frame, R, lever, Q, segment rack, k, and spring, g, substantially as described for the purpose specified.

NOTE.—In the above list of patents SIXTY-FIVE were obtained through the office of this paper.—EDS.

PENDING APPLICATIONS FOR REISSUES.

Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address MUNN & CO., *37 Park Row, N. Y.*

71,955.—SUSPENSION BRIDGE.—Charles Bender, New York city. Dated Dec. 10, 1867. Application for reissue received and filed Dec. 26, 1867.

I claim, 1st, The construction and arrangement of one or more yielding joints, connecting the beams or trusses of stiffened suspension bridges, substantially for the purpose herein described.

2d, I claim the use of balls, serving as material axis of rotation of said yielding joints, and I also claim the means and method to prevent any horizontal deviation of one or more of the adjoining parts of the beams or trusses, substantially for the purposes specified, both for all kinds of stiffened suspension bridges.

3d, I claim the attachment of the ends of the cables or chains at or near the first or shore piers to the longitudinal beams or to the trusses of stiffened suspension bridges, substantially as set forth.

4th, I claim the method employed to reduce the side motion, by leaning the longitudinal beams or trusses of stiffened suspension bridges against all the piers; and I claim also the attachment, on one pier immovable in any horizontal direction, while at the other piers allowance is made for the variations of the length of the beams or trusses, substantially for the purposes set forth and described.

5th, I claim one or more rollers, or pieces of rollers, with or without journals, placed on the end piers of stiffened suspension bridges, substantially for the purpose specified.

6th, I claim the means and method by which the beams and trusses of stiffened suspension bridges are secured vertically to the end or shore piers by use of the weight of the piers, if said bridges are constructed according to any of my claims, 1st to 5th inclusively, and I claim that method for suspension bridges with abutments, and I claim in all cases the means to allow thereby for the expansion and contraction of the bridge, for the purposes set forth and described.

70,648.—LAST.—Ambrose Taylor, Osawatomie, Kansas.

Dated Nov. 5, 1867. Application for reissue received and filed Dec. 27, 1867.

I claim, 1st, The spring hook, E, secured by its shank, F, in the block, B, and engaging with the hook, C, set in the last, A, all constructed and arranged to operate as herein set forth for the purpose specified.

2d, I further claim the prevention of lateral or backward movement of the block, B, by having the hook, C, extend upward above the surface of the upper side of the last, and within a recess in the under surface of the block, B, substantially as shown and described,

595.—APPARATUS FOR VULCANIZING CAOUTCHOUC.—George E. Hayes, Buffalo, N. Y. Dated March 5, 1861. Application for reissue received and filed Dec. 27, 1867.

I claim, 1st, A vulcanizing vessel or oven having its opening and closing joint for insertion and removal of the mold at or near the bottom, by making it of two main sections, the upper or inclosing one of which forms the body of the vessel, while its lower section constitutes a base thereto, substantially as specified.

2d, So constructing and using a vulcanizing vessel with a flattened bottom as that the plaster mold containing the rubber compound shall be in contact with the inside of the lower part of the vessel, so that the heat from the lamp or other heater shall be applied directly to that part of the vessel upon which the mold lies, substantially as and for the purposes set forth.

3d, A mercury chamber formed in the upper section of the vulcanizing vessel, the same being constructed and arranged with the thermometer essentially as described.

4th, The open ring, C, in combination with the bottom, A, band, D, and cover, E, substantially as specified.

44,130.—METALLIC CONCENTRATOR.—Zenas Wheeler, San Francisco, Cal. Dated Sept. 6, 1864. Application for reissue received and filed Dec. 27, 1867.

I claim, 1st, The arrangement and combination of the corrugated surface, B, with a vibratory or oscillating pan or concentrator.

2d, The inclined grooves, K L and K' L', or their equivalent, in combination with a vibratory or oscillating pan or concentrator.

3d, The opening, D, in combination with a vibratory or oscillating pan or concentrator.

4th, The bowl, F, and tube, F, or either of them, in combination with a vibratory or oscillating pan or concentrator, substantially as and for the purposes herein specified.

36,201.—FLUID METER.—Napoleon Aubin, Montreal, Canada.

Dated Aug. 19, 1862. Application for reissue received and filed Dec. 28, 1867.

I claim the combination of a diaphragm or its equivalent with a reversing apparatus and a slide valve, connected each with the other without the use of stuffing boxes, and the whole inclosed within a proper receptacle containing a valve seat, and constituting a fluid meter, constructed and operating substantially as above described.

I also claim constructing fluid meters with a single slide valve of such length that it will not cover both of the outside ports in the valve seat at the same time, in combination with a reversing apparatus arranged to throw said valve, while acting upon it, rapidly across the said ports, substantially as and for the purpose above described.

I also claim the use in fluid meters of a diaphragm when combined with a short slide valve of the above description, substantially as and for the purpose above described.

I also claim the use in fluid meters of compression springs when combined with a short slide valve of the above description, substantially as and for the purpose above described.

I also claim constructing the receptacle of fluid meters in two pieces, one half of which contains part of the side pipe, and the other half the other part thereof, when the joint between the two is made by a diaphragm, and the latter acts upon a reversing apparatus contained in one half of the said receptacle, substantially as above described.

16,627.—MACHINE FOR CUTTING DOVETAILS AND THEIR GROOVES.—Harvey Church, Troy, N. Y., assignee of Elbridge G. Matthews, Clear Water, Minn. Dated Feb. 10, 1857. Application for reissue received and filed Dec. 28, 1867.

I claim the use of knives of a form as hereinbefore described, either stationary or having a reciprocating motion, for cutting dovetails, or male and female grooves "cut under," in place of cutting them with knives having a rotary motion, the knives so described being used either singly or in combination with others for miters, as may be desirable.

I likewise claim the combination with the fixed stock, Q, of the mitering knife, f, and scouring and cleaning knives, e e, as herein set forth, for forming at one operation the miter and dovetail tongue and groove.

I likewise claim in combination with the fixed stock and mitering and dovetailing cutters above described, the traversing of the block or board in a clamped position past the same, or a reverse process, namely, moving the cutters adjusted in the fixed stock past the block or board clamped in position as described, all for the purpose of having the miter and dovetail formed therein as set forth.

9,781.—MOP HEAD.—George I. Colby, Waterbury, Vt., assignee of Harvey Murch, Lebanon, N. H. Dated June 14, 1853. Extended May 20, 1867. Application for reissue received and filed Dec. 28, 1867. Division A.

I claim, 1st, The combination of a socketed cross head with a binder having the two ends thereof united, the combination being substantially such as described.

2d, The combination of a socketed cross head with a binder having the two ends thereof united and a single fastening for holding the whole binder in such position as to clamp rags, etc., the combination being substantially as described.

3d, The combination of a socketed cross head with a handle and a binder having the two ends thereof united, the combination being substantially such as described.

4th, The combination of a socketed cross head with a handle and a binder having the two ends thereof united and secured in clamping position on the handle, so as to sustain or aid in sustaining the cross head, the combination being substantially such as set forth.

5th, I claim a binder in combination with a hondle when the former can move longitudinally with reference to the latter, and is secured thereto when desired, the combination being substantially such as described.

9,781.—MOP HEAD.—Geo. I. Colby, Waterbury, Vt., assignee of Harvey Murch, Lebanon, N. H. Dated June 14, 1853. Extended May 20, 1867. Application for reissue received and filed Dec. 28, 1867. Division B.

I claim, 1st, The combination with a cross head and binder of a ratchet fastening, the combination being substantially as described.

2d, The combination of a ratchet fastening, handle, binder, and cross head, the combination being substantially as set forth.

☞ NOTE.—*The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of 30 days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application.* MUNN & CO., *Solicitors of Patents, 37 Park Row, N. Y.*

The richest silver mining region in Europe, at the present day, is the Austrian dominions, at Przibram, in Bohemia. Some of the ores found in that place are remarkable, one vein in particular being composed almost wholly of ruby silver ores. Some of the zinciferous ores in this vicinity contain a very large percentage of cadmium, as compared with the blendes of other parts of the world. Several of the mines at Przibram are now worked to a depth of more than 1,800 feet, with no appearance of giving out.

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January 7, 1868. No. of patent 70,558.

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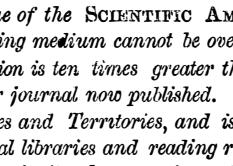

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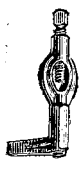

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From 3/8 to 2 inches, 8 sizes, inc.....$ 8 00
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Sent by Express to any address. For circular send to
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THE AMERICAN TURBINE WATER WHEEL, Patented by Stout, Mills, and Temple, possesses new and valuable improvements, and remedies defects which exist in all other Turbine wheels. Per cent of power guaranteed to be equal to any overshot wheel. For descriptive circulars address OLIVER & CO.,
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Process to manufacture vinegar by the quick process, without alcohol, directly from corn.
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Running West from Omaha
ACROSS THE CONTINENT,
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This brings the line to the Eastern base of the Rocky Mountains, and it is expected that the track will be laid thirty miles further, to Evans Pass, the highest point on the road, by January. The maximum grade from the foot of the mountains to the summit is but eighty feet to the mile, while that of many eastern roads is over one hundred. Work in the rock cuttings on the western slope will continue through the winter, and there is now no reason to doubt that the entire grand line to the Pacific will be open for business in 1870.

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The United States also makes a donation of 12,800 acres of land to the mile, which will be a source of large revenue to the Company. Much of this land in the Platte Valley is among the most fertile in the world, and other large portions are covered with heavy pine forests and abound in coal of the best quality.

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The authorized capital of the Company is One Hundred Million Dollars, of which over five millions have been paid in upon the work already done.

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At present, the profits of the Company are derived only from its local traffic, but this is already much more than sufficient to pay the interest on all the Bonds the Company can issue, if not another mile were built. It is not doubted that when the road is completed the through traffic of the only line connecting the Atlantic and Pacific States will be large beyond precedent, and, as there will be no competition, it can always be done at profitable rates.

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CLARK, DODGE & CO., Bankers, No. 51 Wall st.
JOHN J. CISCO & SON, Bankers, No. 33 Wall st.,

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A New Pamphlet and Map, showing the Progress of the Work, Resources for Construction, and Value of Bonds, may be obtained at the Company's Offices, or of its advertised Agents, or will be sent free on application.

JOHN J. CISCO, Treasurer.

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WE are prepared to contract and furnish to order Milled Machine Screws of every description. A large assortment of the American Machine Screw constantly on hand. TUCKER & APPLETON,
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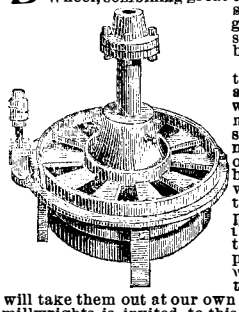

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ARROWSIC EMERY, Manufactured at Bath, Me. All numbers from four up to one hundred and twenty. The only real mine in the world, excepting in Turkey. For sale in quantities to suit, at reduced prices, by STANWOOD, McLELLAN & FULLER,
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Manufactured by
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FOR Inclined Planes, Standing Ship Rigging, Bridges, Ferries, Stays or Guys on Derricks and Cranes, Tiller Ropes, Sash Cords of Copper and Iron, Lightning Conductors of Copper. Special attention given to hoisting rope of all kinds for Mines and Elevators. Apply for circular, giving price and other information. 1 9*tf

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N. B.—This detector is covered by two U. S. patents. Parties using or selling these instruments without authority from me will be dealt with according to law. 2 13*

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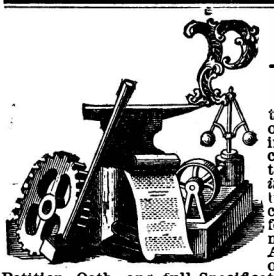

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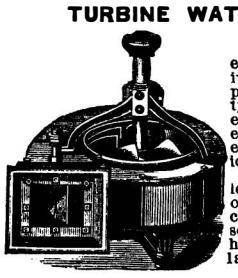

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